Appendix B
Sampling and Analysis Plan

Mahoning River, Ohio
Sediment and Bank Sampling, Characterization and Distribution Study

Prepared for:

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CELRP Rights of Entry

1.0 Introduction

1.1 *Purpose of SAP*

The Sampling and Analysis Plan (SAP) provides the specific rationale and procedures for the collection of samples and the generation of representative geotechnical and chemical data for the Mahoning River, Ohio sediment characterization. Measuring the presence of chemicals in soil at part per billion levels is subject to numerous variables that may affect the veracity of the results. The purpose of the SAP is to systematically control variability and minimize potential measurement errors. This SAP provides detailed instructions and criteria to effectively implement field sampling and laboratory analyses that will result in data that accurately depicts actual conditions and supports accomplishment of the project objectives. Flexibility was built into the Statement of Work and into this SAP to adjust sample locations, numbers of samples and associated analytical parameters based on conditions encountered during field sampling.

1.2 *Sampling and Analysis Plan Organization*

In accord with the requirements of USACE EM 200-1-2 and EM 200-1-3, this SAP is based on application of the Data Quality Objectives (DQO) process. Section 2 of the SAP is the Field Sampling Plan, (FSP), which describes the basis for field location of samples, and the equipment and procedures to be used to procure and deliver representative samples from the specified locations to the designated chemical and geotechnical laboratories. Section 3 is the Quality Assurance Project Plan (QAPP). The QAPP details the laboratory procedures, data quality indicator and Quality Control (QC) criteria for evaluating and determining the usability of the chemical data generated by the project. Tables B-1 and B-2 and Figures B-1 through 13 are located at the end of the text. The remaining tables are integrated into the text sections.

1.3 *Sampling and Analysis Plan Summary*

The project description is provided in the PWP. It provides a summary of site history and conditions relevant to sediment contamination in and adjacent to the Mahoning River. The PWP also references previous investigation results and provides a summary of the relevant findings.

The sample design for the sediment characterization was developed by CELRP based on consideration of the previous investigation results, data gaps and the data needed to develop and screen remedial action alternatives for the project. The design is based on consultation with US Environmental Protection Agency (USEPA), Ohio EPA, Eastgate Regional Council of Governments (ERCOG) and others. Final transect locations were based on site reconnaissance by Altech and CELRP personnel, and the number of scheduled samples and chemical analyses were based on consideration of a combination of technical and cost issues. Table B-1 is a comprehensive summary of the selected sampling and analyses. Table B-2 provides a detailed, line-by-line, account of every boring, sample and chemical and geotechnical analysis scheduled for the project.

Table B-1 Sampling and Analysis Plan Summary

Located at the end of the text due to size, and for easy detachment and reference during review of the SAP.

Table B-2 Chemical and Geotechnical Sample Analysis Schedule

Located at the end of the text due to size, and for easy detachment and reference during review of the SAP.

Figure B-1 is a depiction of a model transect, which provides the basis for establishing core boring and sample intervals within each core boring along a typical cross-section through the river. A total of 87 transects, were selected for the advancement of soil borings at nine locations, three distributed across each bank up to the OHW line and three in the river, as depicted in Figure B-1. A tenth boring is also scheduled in each transect where a potential Brownfield issue has been identified, and will be placed at the OHW line at the end of the transect nearest the potential Brownfield. Figures B-2 through B-13 show the designated transect locations. Figures B-1 though B-13 are presented after Tables B-1 and B-2 for easy detachment and reference during review of the SAP and use in the field.

2.0 Field Sampling Plan (FSP)

2.1 *Project Description*

The project description is provided in the PWP.

2.2 *Project Organization and Responsibilities*

The project organization and responsibilities are described in Section 1 of the PWP and Appendix A, the QCP. The following presents the organization of field sampling team personnel.

Mr. Mike Saffran, the Altech Senior Project Manager will serve as the Field Sampling Team Leader and Site Safety Supervisor during the first of two scheduled sampling episodes. Mr. Mark Cruickshank, a project geologist with Altech is the Field Sampling Team Leader and Site Safety Supervisor scheduled for the second episode of field sampling. The Field

Sampling Team Leader is responsible for overall execution of this FSP, including coordinating the activities of all three crews and directing the activities of one of the crews.

Ms. Melissa Cruickshank, a project geologist, and Mr. John Bochenek, a project scientist with extensive field soil classification experience will lead the other two sampling crews. Each of these individuals has the primary responsibility for examination of each soil core collected by their respective crews and determining breaks in soil strata and assigning Unified Soils Classification System designations. Each is responsible for preparing detailed field records of the subsurface conditions encountered at each transect and core boring location.

Mr. Arinze Nwamba, a staff engineer will assist the Field Sample Team Leader as a sample coordinator. His primary responsibility will be sample tracking, which will include filling out chain of custody forms and preparing labels for sample containers and maintaining a running tally of scheduled samples versus samples actually collected. The sample coordinator shall assist with the handling and management of investigation derived waste and perform a general support role to the three sampling crews.

Coleman Engineering Company (CEC) is responsible for providing all necessary sampling equipment along with a boat and operator for each of the 3 crews. CEC is also providing an additional sampling technician for the river crew for the duration of sampling activities. Each boat operator is an experienced sampling technician or driller. During the first sampling episode, CEC will also have a senior geologist with the firm with specialized expertise in soft sediment sampling techniques and a senior field manager responsible for coordination of all logistical aspects of field sample collection activities.

The Altech and CEC personnel shall work in unison to perform the following field sampling activities;

- Document GPS location, river mile, date, time, river depth (when working in stream), core depth, horizon depths, and distance of core from rivers edge.
- Collecting samples,
- Geotechnical classification of soil type and consistency,
- Sample container labeling,
- Decontaminating sampling tools,
- Preparing field boring logs documenting subsurface conditions encountered, including depth of water, core depth, depths of distinguishable soil horizons and location offset from the river bank,
- Preparing samples for transport,
- Chain of Custody documentation, and
- Shipment of samples to chemical and geotechnical lab.

2.3 *Scope and Objectives*

A total of 798 borings are scheduled for the project. As depicted in the typical transect in Figure B-1, nine borings are scheduled at each of 87 transects across the river, and a tenth upland boring is scheduled for 15 of these 87 transects. Twelve of the upland borings are intended to address potential Brownfield issues associated with adjacent properties. The other three are designed to help establish natural background conditions for upland soil. Figure B-1 is a conceptual model of the site conditions that prevail along the subject reach of the Mahoning River, and it depicts the logic for locating borings within each transect and selecting discrete sample intervals within each boring.

Forty of the 87 transects are labeled "Observational Transects." At each of these 40 transects, the same set of borings are scheduled, but only two of the borings will be sampled for chemical analysis purposes. None of the collected samples from the remaining 7 or 8 borings advanced at these 40 transects are scheduled for laboratory analyses. The remaining 47 transect locations are termed "Lab Transects." At the "Lab Transect," samples shall be collected for chemical and geotechnical analyses from all nine (ten where an upland control boring has been specified) borings in each transect. Figures B-2 through B-13 use a solid line to indicate the location of each Observational Transect and a dashed line to indicate the location of each scheduled Lab Transect.

For consistency with prior investigations and CELRP terminology, the banks at each transect are labeled as the left descending bank and the right descending bank looking downstream. This convention is depicted in Figure B-1. The scheduled transects are numbered sequentially from 1 to 87, with Transect 1 at the upstream end of the project and Transect 87 at the downstream end of the project. Table B-1 provides a comprehensive summary of the scheduled list of transects, and Table B-2 provides a detailed summary of the chemical and geotechnical analyses scheduled. Figures B-2 through B-13 depict the locations of each of the 87 scheduled sampling transects.

2.4 ***Field Sampling Activities***

2.4.1 Rationale

2.4.1.1 Transect Locations

A conservative judgmental approach was used to select 87 transect locations that represent "worst case" conditions relative to the levels of chemicals and the quantities of contaminated sediment present in the vicinity. In general, each transect was selected to enable sampling at locations most likely to have maximum thickness of fine-grained sediment deposits.

Approximately 70 of the 87 scheduled transects have been located and marked in the field with pink flagging. These recommended locations include both free flowing and pooled areas in the "model reach" and the subject reach based on field reconnaissance. However, the Field Sampling Team Leader shall survey the area in proximity to each designated transect for low lying mud banks below the OHW line to establish final boring locations in the field. The Field Sampling Team Leader shall lay out each transect at the location with the greatest lateral extent of soil bank below the OHW line, and may align it at a diagonal across the river to achieve this end.

2.4.1.2 Boring Locations

The selection of nine borings between the OHW line along both banks is intended to facilitate two-dimensional delineation of the extent of contamination. The nine borings in each transect are labeled a through i, as indicated in Figure B-1. Conceptually, the three river cores (d, e and f) are intended to depict the sediment conditions across the river from left to right looking downstream. Likewise, the three cores on each bank are intended to depict bank sediments (down the left bank - a, b and c and up the right bank - g, h and i) from left to right looking downstream. At twelve of the 87 transects, a potential Brownfield issue has been identified on one bank. At these twelve transects an upland core will be advanced and collected at or near the location of the OHW line. At three other locations, believed to be representative of natural background conditions, an upland core will also be advanced and collected. All of the 15 upland borings will be labeled u.

At each bank of a selected transect, the geologist leading the individual sampling crew shall locate the OHW line. Table B-1 lists the estimated height of the OHW line above low pool at each of the 87 transects to aid this determination in the field. Prior to advancing sample collection equipment into the subsurface for the river or the land borings, a metal probe rod will be used to locate individual borings within each transect. A sufficient number of probes shall be advanced across the length of each transect to determine refusal depths and to estimate material consistency for selecting optimum "worst case" coring locations. An optimum "worst case" location is considered to be a location with the maximum thickness of soft fine grained soil.

The locations of the most upslope core sample on each bank of every transect (Cores "a" and "i"), which lie between the shoreline and the ordinary high water line, are critical as they will define the lateral limits of contamination. These cores can only be located through trial and error, and the probe rod is intended to aid selection of the locations for the "a" and "i" cores. At some transects, the location of the "b" or "h" coring may be critical to determining the vertical distribution of contamination, at other locations it may be irrelevant and/or impractical to attempt due to the steepness of the bank. The "b" and "h" corings are most critical at locations where a large volume of deposition has occurred below the Ordinary High Water line.

The "c" and "g" corings are always to be located at the soil water interface at the left and right banks, respectively. The "d, e and f" corings are to be situated in the river at locations where the greatest thickness of fine grained sediment is present. These three corings are not to be equally spaced across the river, rather they are to be skewed toward the areas most likely to be contaminated, areas within the river where fine grained silt and clay particles have fallen out of suspension.

Resistance to manual advancement of a metal probe rod shall be noted at each coring location. Along the banks, denser material has been found to overlay soft black oily contaminated horizons. It may be necessary to use a slide or sledge hammer to penetrate these upper materials with the probe rod in some places. The resistance encountered during probing will help indicate depth locations of breaks in soil horizons and support selection of the most appropriate sampling device and method to procure an undisturbed continuous soil core sample to the refusal depth at each of the designated cores in the transect.

The depth to probe rod refusal shall be recorded at each core location and the rod examined upon retrieval for evidence of oily residue. The depth to probe rod refusal will be compared to the core refusal depth, and when core refusal is less than the depth to probe rod refusal, a different coring technique may be required to retrieve a core sample to the probe rod refusal depth or to determine that refusal occurred in gravel.

The actual location of cores will be determined in the field using a portable Differential Global Positioning Survey (DGPS) unit. Using a radio beacon for correction, the accuracy of the survey will be sub-meter. Coring locations will be recorded on the records of subsurface exploration according the coordinate system used for the base mapping provided by CELRP. DGPS elevation data will be recorded, but the detailed mapping for the project will be used to define top of boring elevation. Using the detailed mapping to define elevations is also appropriate because the top of ground surface at each cross-section will come from the detailed project mapping, which will serve as a basis for estimating sediment quantity.

Due to the large number of samples and array of analyses scheduled, the importance of maintaining consistency in locating and assigning labels to borings and samples for analyses is essential and cannot be over emphasized. As shown in Figure B-1, the c and g cores shall always be the located at the shore line at the left and right banks, respectively. At locations where physical circumstances preclude advancement of a core boring and collection of a continuous soil core sample for observation and testing, the individual boring location shall be labeled according to the convention established in Figure B-1 and a note affixed indicating the reason for not collecting a soil core sample at the location. All significant changes between planned and final sample locations will be thoroughly documented in the field at the time of occurrence.

2.4.1.3 Intervals for Collection of Samples for Chemical Analysis

At each coring location where chemical analysis samples are required, 3 discrete samples have been budgeted. However, the actual number of samples collected shall be based on the conditions (actual number of distinguishable soil horizons) encountered. Based on the conceptual model presented in Figure B-1, three distinct zones or horizons within each of the core borings are anticipated. In the model, the first horizon and the last are comprised of relatively uncontaminated sediments, while the middle horizon is comprised of contaminated sediments. In the field, actual conditions may include more or less than three distinct soil horizons. The intent of this SAP is to use sampling techniques that preserve each distinct soil horizon from the top of ground to refusal on bedrock, gravel or to a depth of 15 feet, and to use professional judgment by properly trained and experienced field geologists to select discrete sample locations for chemical analysis from each soil horizon at each core location based on physical examination of the complete core.

At the a, b, h and i cores in each transect, the first sample is needed to address potential direct contact hazards, and the first sample shall be collected from the ground surface through the first six inches of the soil column. At the c, d, e, f and g cores, close examination of the core for an upper soil horizon as thin as several inches is critical to evaluating recent sediment deposition and potential natural attenuation capacity and rates. If a thin horizon is present at the surface of any c, d, e, f or g core scheduled for chemical analysis, it shall be sampled discretely (soil material only from that horizon). If a thin upper horizon is not distinguishable at a particular c, d, e, f or g core, then the first sample for analysis shall be collected from the upper six inches of the soil column.

The bottom sample at each core is important, because it is intended to be representative of the likely post project condition. The depth of each core will be determined based on resistance below obviously contaminated material to a relatively impermeable layer, or refusal. Refusal is defined as bedrock or gravel, or to the original, non-contaminated streambed. If roots or woody debris interfere with penetration, the core must be relocated.

The anticipated maximum sample depth below top of ground shall range between 1 to 15 feet. Only depositional material, such as silt, sand, and clay will be sampled, and based on results of previous investigations, a clay lens is generally expected at the bottom of each core. The bottom sample is intended to be representative of the soil horizon, within which, refusal was encountered. If the refusal material is not recoverable because it is bedrock, cobbles or dense gravel, the field geologists shall use professional judgment regarding selection of a bottom sample for the core for chemical analyses.

Between the top and bottom soil horizons in each core (representative samples from the top and bottom soil horizons), each distinct soil horizon shall be sampled discretely. Additional cores shall be advanced as needed to procure adequate sample volume from each horizon at each core location designated for the collection of samples for chemical analysis.

The Field Sampling Team Leader will keep a running total of budgeted number of samples to actual samples collected for each analytical parameter. The planned versus actual number of samples will be reported on the Daily Chemical Quality Control Report.

2.4.1.4 Quality Control and Background Samples

Transects 1 to 7 are upstream of the industrial portion of the river. The data from the first four, (and perhaps the first seven transects depending on the results) is scheduled to establish the baseline levels of potential chemical contaminants in the "model reach." The locations, number and array of analyses scheduled for these transect were selected to provide a sufficient database to accurately characterize the conditions in the "model reach."

Quality control samples will include the collection of one field duplicate sample for every 20 field samples collected for each analysis method. Table B-2 depicts each location where a field duplicate sample is scheduled to be collected. At each of these locations, two cores shall be collected, and the field duplicate shall come from the same depth interval as the field sample.

The field geologist may use professional judgment to collect additional field duplicate samples or to change the location where both a field sample and a field duplicate sample are collected. However, there must be a minimum of one field duplicate for every 20 field samples collected for each analytical parameter. Quality control samples will also include the collection of 10 rinse blank samples to determine if sampling equipment and methods may have contributed detectable levels of chemicals to the samples.

2.4.1.5 Mahoning River Geotechnical Sediment Sample Locations

At each of the 47 Lab Transects two composite samples are scheduled to be collected for geotechnical analyses. The first composite sample is scheduled to be comprised of representative proportions of sediment from the three river borings in each designated transect. The second composite sample is scheduled to be comprised of representative proportions from the six land borings in that transect. The geotechnical composite samples will be analyzed for the following geotechnical properties:

- Grain Size
- Specific Gravity
- Atterberg Limits

- Organic Content
- Moisture Content

2.4.2 Sampling Procedures

The field sampling will be conducted by a team of Altech and CEC personnel. Three crews, (one for the river and one for each bank), are scheduled to work simultaneously advancing and collecting continuous soil cores. Each crew will be equipped with a John Boat and all appropriate sampling, decontamination and personal protective equipment. Each land crew will include a Sampling Technician from CEC and a Geologist or engineer from Altech. The river sampling crew will consist of three individuals, a Boat Operator and a Sampling Technician from CEC along with a Geologist or Engineer from Altech. To maintain maximum flexibility, each crew will be outfitted with all equipment needed to perform either land or river borings.

All samples will be procured in accord with the procedures described below, which are designed to conform to the standard environmental protocol for sampling procedures described in EM 200-1-3. All due care will be exercised to adhere to these procedures and to prevent the introduction or loss of any contaminants in a sample from the sampling equipment, tools or methods of procuring, containerizing and transporting samples to the laboratory.

To minimize soil disturbance during sampling and to collect samples that retain fine stratification present in sediment and soft soils requires use of a thin walled sampling device. Several thin-walled sample tubes were tested during the reconnaissance to evaluate potential collection equipment and procedures. Two primary methods of sample collection are described below, which should be the optimum means for collecting nearly every designated core sample. Several other types of back-up sampling equipment will be readily available to handle special circumstances.

2.4.2.1 Lexan® Tube Sampling

Lexan® Tube Sampling stood out as the most efficient means of collecting a continuous soil with minimal disturbance. This is a method that should be applicable to nearly all river core borings and most river bank core borings. The target contaminated sediments are generally so soft, where present, that a 2-inch diameter transparent Lexan® tube can be directly hand pushed through the subsurface, even in areas where up to two feet of riverbank soils were found over soft black oily muck. Lexan® is a high-strength, inert thermoplastic resin material ideally suited for collecting continuous cores. Each tube will make an ideal container for procuring and packaging discrete samples from specific subsurface intervals. The relative cost allows each Lexan® tube to be used as a disposable sampler, which eliminates significant decontamination time and effort from the field sampling process.

To retain the soft sediments in the Lexan® tube when retracting, especially in river corings, a seal must be formed over the top end of the tube to maintain a vacuum. In some cases it may be necessary to fill the tube to the top with water before capping to improve the vacuum that retains the sample within the tube during extraction. The full Lexan® tube shall remain vertical during extraction, and the bottom capped as soon as practical. With the bottom capped, the core sample shall be placed on a hard surface, and the outer surface wiped clean of mud and soil residue to aid thorough physical examination. While in the vertical position, any water above the top of sediment in the core shall be bled off by sawing a small slit just above the soil line. The excess tube above the top of soil line is cut off and capped while maintaining the core vertical. After both ends have been capped, the core sample may be inclined to facilitate collection of discrete and composite samples for laboratory analyses.

Selection of intervals for discrete samples shall be based on the results of probing and close examination of the transparent Lexan® tube by the geologist. As designated by the geologist, sections of the tube representing the discrete soil horizons to be sampled will be cut with a handsaw, the ends examined, capped, labeled and placed in a cooler for subsequent transport to the GPL laboratory by the geologist.

Upon collection of all discrete samples for chemical analyses, the remaining portions of the core shall be closely physically and visually examined by the geologist to aid geotechnical description of the materials encountered in each soil core boring and for extraction of representative proportions for preparation of the composite geotechnical samples at each Lab Transect. A new Lexan® tube will be advanced for each core boring. If additional sample quantity is needed to fill all appropriate sample containers, additional cores shall be taken as needed within close proximity to the initial core hole in the same manner. Excess soil is to be returned to the core hole from which it came.

The Lexan® tube brought to the site shall be in 8-foot lengths. If the probing indicates a greater sample depth is required, one of two options shall be exercised at the discretion of the geologist or Field Sampling Team Leader. One option will be to push a Lexan® tube to within a foot of the top of water or top of ground surface and connect another Lexan® tube section with a short coupling section of a slightly larger diameter piece of Lexan® tube and glue the couple and two end sections together. The other option will be to utilize the MacroCore® sampling system, as described below.

The Lexan® tube may be driven with moderate success, based on the unbraced length of tube being hammered and the nature of the material being penetrated. However, if a significant thickness of stiff or dense soils must be penetrated, there are several options. Which option is selected will be based on the probing results. If a soft suspected contaminated soil layer exists below stiff or dense soils, the first option would be to use the MacroCore® system described below to procure the core sample through the denser overburden material, then to go back down the same hole with the Lexan® tube procedure to procure the least disturbed sample of the softer material to the refusal depth. If the probing indicates that there is no soft layer or zone, then the MacroCore® system described below should be employed to produce the designated continuous core sample from the ground surface to refusal.

2.4.2.2 MacroCore® Sampling

If subsurface conditions prevent the manual advancement of Lexan® tubes, a Geoprobe® MacroCore® sampler will be employed. This sampling method and equipment were developed for use with a truck or track-mounted Geoprobe® coring machines, which use an automated hammer to drive and retract the MacroCore® sampler. However, the size, weight and make-up of the sampling tubes will allow ready adaptation of manual methods of advancement and retraction.

The MacroCore® Soil Sampler was designed for the collection of environmental soil samples for chemical analysis and consists of a 48-inch long by 2.0-inch outer diameter steel sampling tube with a stainless steel cutting shoe. A new clear disposable plastic liner is used to maximize the integrity of each sample and minimize potential cross-contamination between samples. The liner is a 46-inch long by 1.75-inch diameter, movable/replaceable, thin-walled plastic tube inserted inside the MacroCore® Sampler for the purpose of containing and storing soil samples. It is capable of recovering a sample that measures up to 1302 ml in volume in the form of a 45-inch by 1.5-inch core. To prevent loose soils from falling out of the bottom of the sampler as it is retrieved, a clean MacroCore® core catcher may be used. The core catcher is constructed of plastic (PETG), and works with the disposable plastic liners.

If the depth to refusal is 10 feet, the MacroCore® sampler would be advanced and retracted three times to complete the continuous core boring. The first 45-inch interval is sampled as described above. To collect the core from the second 45-inch depth interval, a piston is installed in the closed position at the leading end of the MacroCore® sample tube. The tube is connected to an extension rod and placed back down the bore hole and advanced to the depth for the next sample. Then the piston is opened, and the sampler is then pushed or hammered forward to termination. Each subsequent interval is sampled in the same manner to refusal or 15 feet, which ever is less. The acetate liner is filled with sediment as the tube is advanced to a total depth of 8 feet. This process shall be repeated up to the termination or refusal depth for the individual core boring.

The sampler shall be removed from the core hole using either manpower or a slide hammer, carefully maintaining the core as close to vertical as possible during retraction. Each plastic liner full of sediment from each successive interval shall be extracted from the sampling tube and laid out in order to be observed by the Field Sampling Team Leader for identification of distinct soil horizons and selection of the discreet samples for laboratory analyses.

At in-river core locations sampled by the MacroCore®, it will not be possible to go back down the exact same hole for each successive sample interval. The geologist shall attempt to locate each successive sample for each individual coring location as closely as possible to the location where the first sample interval was collected. Minor differences in horizontal location should not impede the field geologist preparation of a core log that depicts the results of each MacroCore® Sample interval and provides a continuous record of subsurface conditions from top of ground to refusal or termination at 15 feet.

2.4.2.3 Other Core Sampling Procedures

The two methods described above should enable collection of all designated samples. Also, a combination of the first two methods may be employed. For instance, at a specific location where the manual refusal depth is 14 feet and all of the overlying material is soft, a Lexan® tube may be used to collect a core sample to a depth of 10 feet. Then, the MacroCore® Soil Sampler with piston and liner may be advanced to a depth of 10-feet in the closed position, then the piston opened and the sampler advanced to the refusal depth to collect the last four feet of material needed to have a continuous core from the ground surface to the refusal depth. The opposite approach could apply in the case of stiff or dense soils overlying softer soils; whereby the stiffer material is sampled via the MacroCore® procedure and the softer soil is collected using the Lexan® tube procedure.

As a backup for special circumstances, a variety of other sampling equipment will be maintained at the job site, including a 4-inch diameter aluminum pipe sampler. Several stainless steel split spoon samplers and drill rods and other manual sampling equipment and techniques to procure samples (ie. Large Bore sampler, Russian Peat Borer, Slide Hammer Sampler) will be available to help procure samples. The combination of a shovel and stainless steel trowel may be used to collect samples for chemical and geotechnical analyses where the depth to refusal is shallow or surface soils are very stiff or very dense. A stainless steel hand auger may also be used to penetrate gravel or roots impeding collection of sediment from lower soil horizons.

A larger diameter metal tube sampler with threaded couplings shall be advanced at several locations where the core refusal depth is less than the probe rod refusal. The purpose will be to determine if large diameter tube sampling will enable more complete and accurate characterizations of the nature of the refusal materials in the subject reach. It is important at each location to distinguish if refusal is caused by bedrock, gravel, very stiff soils or fill materials such as slag.

John boats will be used as the means of transport of equipment and supplies to each transect. The boats will be maintained and equipped by CEC. Multiple access points to the river will be used. A potential exists for the use of a combination of the above sampling techniques for the completion the collection of the required samples. The sampling technique(s) for each boring will be selected to best achieve maximum core recovery, with as little subsurface disturbance as possible. If insufficient sample recovery prevents collection of the required volume, then multiple cores shall be collected.

2.4.3 Boring Logs

A complete record of subsurface exploration will be developed for each of the 798 borings. gINT™ software will be used to generate each log.

2.4.4 Field Measurement Procedures and Criteria

No field analyses are scheduled. The only field measurements will be the horizontal distance from the shore for all banks and in-river core samples and the vertical distance above the river pool elevation for all bank samples. Each sample crew will have a 25-foot tape for measuring continuous core samples and offsets from the edge of water for both in river and bank core locations. Elevations above riser pool shall be measured using a hand level and/or tape.

2.4.5 Sample Preparation

2.4.5.1 Samples for Laboratory Chemical Analysis

Discrete samples for chemical analysis shall be prepared in the following manner. Upon retrieval of the clean disposable Lexan® tube or acetate liner (from MacroCore® samples), the geologist shall examine the soil core from top to bottom, marking distinct soil horizons on the tube and describing them in the field log. At each a, b, h and i core, the first sample will be comprised of the upper six inches of the core. It will be prepared by saw cutting the ends off the tube and capping. At each c, d, e, f and g core, the first sample shall be comprised of the upper soil horizon only, even if it is only a couple of inches in thickness, and additional cores shall be taken as needed to collect sufficient sample volume for the designated analyses. If the upper horizon from the c, d, e, f or g core is greater than six inches in thickness, the upper sample shall be comprised of the upper six inches of the soil column.

At all cores designated for chemical sampling, the additional sample depth intervals shall be dictated by the soil horizons encountered. When a soil horizon is of sufficient thickness, the field geologist shall saw cut a sufficient length of tube to include only soil from that distinct horizon for chemical analysis and cap the ends. If a soil horizon is too thin and insufficient volume of material is available to perform the specified analyses from a single core from a discrete depth interval, additional cores shall be collected as needed. Representative portions of the specific horizon from the multiple cores at the same location (slightly offset as needed to obtain the additional core) will be composited into one sample to represent the discrete soil horizon. All composite samples of discrete soil horizons shall be prepared in accordance with the composite sample preparation protocol described below. Only clean stainless steel utensils shall contact the soil, and the sample container shall be a virgin container free of target chemical analytes and compounds.

A total of 15 upland control core borings shall be located at the high water line. The samples from these core borings are designated to be composite samples, representative of the materials encountered through the full length of the core from top to bottom. There are 12 transects where TCLP analysis of composite samples are scheduled and 4 transects where composite samples are scheduled for radioisotope analyses.

For each composite sample, representative portions through the full length of the cores designated shall be placed in a large (two gallon or larger) clean stainless mixing bowl.

Using a stainless steel spoon, the sample is homogenized to relative same particle size and consistent appearance by stirring the material in a circular fashion. The material in the bowl is then quartered and the designated sample containers are filled by placing small portions from each quarter into the container until completely full.

Each TCLP sample will be comprised of representative portions from the full length of each of the nine scheduled cores in the designated transect, and no horizons shall be removed before samples are composited. Twelve transects have been selected for collection of TCLP composite samples. At each transect designated for the collection of samples for radioisotope analyses, a composite sample will be prepared to represent each bank (one sample for left bank cores - a, b & c and one sample for right bank cores - g, h & i), and one will be prepared to represent the in-river sediment cores (d, e & f). No soil horizons shall be removed before radioisotope samples are composited.

2.4.5.2 Geotechnical Samples

Two composite samples from each of the 47 transects will be prepared for geotechnical analyses; one from all in-river cores; and one form all bank cores. Representative portions of each sample collected through the full depth of the boring shall be placed in a large (two gallon or larger) clean stainless mixing bowl. Using a large stainless steel spoon, the sample is homogenized to relative same particle size and consistent appearance by stirring the material in a circular fashion. The volume of sample required for each analysis is included in Table B-3. Each of the sample containers shall be filled to the brim to minimize air space in the container after the lid is tightly secured.

2.4.5.3 Field Quality Control Samples

2.4.5.3.1 Field Duplicates

Table B-2 indicates all specified field duplicate samples. One field duplicate sample is scheduled for every 20 field samples collected for each analysis type. Field duplicate samples for discrete samples will be collected by pushing two separate cores in very close proximity to each other. Each field duplicate of a discrete soil sample shall come from the exact same horizon and depth interval as the field sample.

For each composite soil sample, representative portions through the full length of the cores designated shall be placed in a large (two gallon or larger) clean stainless mixing bowl. Using a large stainless steel spoon, the sample is homogenized to relative same particle size and consistent appearance by stirring the material in a circular fashion. The material in the bowl is then quartered and the designated sample container and field duplicate container are filled by alternately placing small portions from each quarter into each container until they are completely full.

2.4.5.3.2 Rinse Blank Samples

A total of ten rinsate blank samples are scheduled to determine if any contaminants have been introduced to the samples as a measure of the integrity of the decontamination procedures and the sampling equipment being used. A minimum of two rinse blanks will be obtained for each type of sampling method and equipment used. Deionized water will be poured over the non-disposable stainless steel sampling equipment and collected in the appropriate containers.

To address the potential for glue used to splice lexan® tube sections together to introduce chemicals to the samples, two rinsate samples will be collected. To prepare each sample, two sections of lexan® tube shall be spliced together. One end shall be capped. The tube shall then be filled with deionized water. The water within the tube will then be poured directly into the designated sample containers.

Analytical requirements for rinse blank samples are as follows:

- TRPH
- PAHs
- PCBs
- Herbicides
- Pesticides
- TAL Metals

Rinse Blank samples shall be labeled sequentially as generated as RB-1 through RB-10. The geologist responsible for preparing each rinse blank sample shall clearly denote the sampling method and equipment applicable to the particular rinse blank sample, along with the time and date of the sample preparation.

2.4.5.3.3 Investigative Derived Waste Samples

A total of ten Investigative Derived Waste (IDW) samples are scheduled for analysis to characterize the waste generated during the sampling phase of the investigation. As described below, the IDW shall be segregated into three waste streams, spent personnel protective equipment, unused portions of sample liners and equipment decontamination fluids. Representative portions of each waste stream will be collected to form a composite of each waste stream for the soils and a grab sample for fluids for waste characterization purposes. The following analytical parameters have been scheduled for IDW analysis:

- TRPH
- PAHs
- PCBs
- Herbicides
- Pesticides
- TAL Metals

Each IDW sample shall be a representative composite of the waste stream to which it applies. IDW samples will be numbered sequentially in the order of preparation, from IDW-1 through IDW-10.

2.4.6 Sample Containers, Preservation and Holding Times

CEC will provide all new disposable Lexan® tubes and MacroCore® acetate liners needed for the collection of all soil cores, from which discrete samples for chemical analysis will be collected. Each discrete sample will be prepared by saw cutting the section of the tube the field geologist has designated from each soil horizon and placing clean plastic caps on both ends. Each Lexan® tube and acetate liner shall be new and free of foreign substances, particularly substances that could change sample quality or interfere with required analyses. Stick-on labels will be affixed to all containers. Clear tape will be placed around the containers and fixed over the labels to prevent deterioration of the labels during handling and shipping. The containers for each sample location will be placed in zip lock plastic bags and placed on ice into the cooler for transport.

Clean sample containers with teflon® lined seals or septa will be procured from the laboratory for each composite sample and each water sample. No chemical sample preservatives are required for the project, with the exception of a nitric acid and a sulfuric acid preservative for the rinse water and IDW fluid samples to be analyzed for metals and TRPH, respectively. Field preservation will include rapid capping of samples such that there is minimum air space, and placement of each properly packaged and labeled sample in a cooler on ice.

The preservation methods, sample-collection containers, and holding times specific to each sample type and sample event are consistent with the requirements of EM 200-1-3 and USEPA SW-846. New disposable Lexan® core sample tubes or new disposable acetate liners used in conjunction with MacroCore® samplers will serve as the sample containers for each discrete sediment sample. Table B-3 below is a list of required sample containers, preservation requirements and allowable holding times between sample collection and analysis for each scheduled chemical and geotechnical analysis.

Table B-3 Summary of Sample Containers, Preservation and Holding Times

ANALYTE	MATRIX	CONTAINER	PRESERVATION	HOLD TIME
TRPH	Sediment	1 - 8" tube	Cool 4°C no headspace	28/28 days (extraction/analysis)
TRPH	Water	2 - 32 oz amber glass	HCL & Cool 4°C	28/28 days
PAHs	Sediment	1 - 8" tube	Cool 4°C no headspace	14/40 days
PAHs	Water	2 – 1L amber glass	Cool 4°C no headspace	7/40 days
PCBs	Sediment	1 - 8" tube	Cool 4°C no headspace	14/40 days
PCBs	Water	2 - 32oz amber glass	Cool 4°C no headspace	7/40 days
Herbicides	Sediment	1 - 8" tube	Cool 4°C no headspace	14/40 days
Herbicides	Water	2 – 1L amber glass	Cool 4°C no headspace	7/40 days
Pesticides	Sediment	1 - 8" tube	Cool 4°C no headspace	14/40 days
Pesticides	Water	2 – 1L amber glass	Cool 4°C no headspace	7/40 days
TAL Metals	Sediment	1 - 8" tube	Cool 4°C no headspace	6 months
TAL Metals	Water	1 - 500mL Plastic	HNO3 & Cool 4°C	6 months
Chromium +6	Sediment	1 - 8" tube	Cool 4°C no headspace	28 days
Chromium +6	Water	1 – 250 ml Plastic	Cool 4°C no headspace	24 hrs
Mercury	Sediment	1 - 8" tube	Cool 4°C no headspace	28 days
Mercury	Water	1 – 250 ml Plastic	Cool 4°C no headspace	28 days
Radioisotopes	Sediment	1 - 8" tube	Cool 4°C no headspace	6 months
Radioisotopes	Water	2 – 1 litre plastic	HNO3 & Cool 4°C	6 months
TCLP -Organics	Sediment	1 - 8" tube	Cool 4°C no headspace	14 days
TCLP -Organics	Water	3 – 1 litre amber	Cool 4°C no headspace	14 days

One 8-inch by 2-inch diameter Lexan® or acetate tube is all the sample volume needed to facilitate analysis for every chemical parameter within the groups defined below. Table B-1 organizes the required sampling into 5 analyte groups. The following lists the group designation and the laboratory requested sample volume for each group.

'T' = Discrete samples for TRPH only - one 8-inch tube

'A' = Discrete samples for all parameters (TRPH, PAHs, PCBs, pesticides, herbicides and metals, including hexavalent chromium) - one 8-inch tube

'R' = Radioisotopes - Composite samples - one 8-inch tube or two 8 oz jars.

'B' = Brownfield = Upland Control = Composite samples for all parameters (TRPH, PAHs, PCBs, Pesticides, herbicides and metals, including hexavalent chromium) - one 8-inch tube or two 8 oz jars.

'TCLP' = Composite samples for all Toxic Characteristics Leaching Procedure parameters - one 8-inch tube or two 8 oz jars

Sample containers for geotechnical analysis will be virgin bottleware provided by DLZ Laboratories, Inc. The geotechnical sample container requirement is one full 32 ounce jar for each composite sample. There are two composite samples at each of the 47 Lab Transects, so the total number of container for geotechnical samples is 94.

2.4.7 Decontamination of Equipment

Bowls, knives, spatulas, spoons and all other non-disposable utensils that contact the sample during sample collection and preparation for quantitative chemical analysis shall be stainless steel. The sampler and all reusable utensils that contact the sample and the required sampling device will be decontaminated between each boring location to prevent cross-contamination. Cleaning will take place at a portable cleaning station. The cleaning or decontamination procedure for all stainless sampling equipment will consist of the following steps:

- Scrub in river water until all significant signs of soil are removed,
- Scrub and wash contaminated equipment sections with non-phosphate detergent and river water,
- Double rinse of river water, beyond which all visible signs of detergent are removed,
- Air dry, and
- Inspection and approval for reuse by the inspecting geologist.

Decontamination will be performed on the stainless steel sampling devices, knives, spatulas, spoons, etc. prior to drilling at the next boring location. All sampling equipment will also be decontaminated before it leaves the site.

2.5 *Sample Chain of Custody Documentation and Record Keeping*

2.5.1 Field Record Keeping Requirements

Each soil core sample shall be closely examined by the Altech geologist to support preparation of a detailed log of subsurface conditions for each core boring. In the river, the depth of water to the top of sediment shall be measured and recorded, and the field geologist shall describe the material retrieved in the core from top to bottom. Depths to breaks in strata shall be measured, and each stratum shall be described. The description shall include the consistency, color and material classification symbol in accordance with the Unified Soil Classification System (USCS), as well as any descriptors or notes regarding laminations or unique characteristics of the stratum. Any other observations pertinent to the characterization of sediments and river bank soils shall also be recorded in the field record of subsurface exploration.

The geologist's description and identification of breaks in strata shall be the basis for selection of sample intervals. The geologist or geotechnical engineer will use a Personal Digital Assistant (PDA) to electronically record all details of subsurface exploration. These records shall be downloaded to a portable computer and sent electronically to the Altech Louisville office at the end of each day of sampling to facilitate prompt preparation of draft subsurface exploration logs and to track and communicate the progress of the Field Sampling activities relative to the schedule. A field logbook will also be maintained to document observations at each transect and coring location.

Documentation of field activities is a very important aspect of the project due to the number of core borings and samples to be collected. Also, using three crews creates potential for inconsistency in descriptions and the manner field data and observations are recorded. Each geologist will be provided a PDA that is pre-programmed for rapid documentation of all essential information at each core boring location, as well as to be used to document all other relevant information related to the field sampling to maintain consistency.

At a minimum, the following records shall be documented by the geologist or engineer leading each crew at each core boring location to serve as the basis for developing the record of subsurface exploration.

- Unique core boring identification number (including transect number),
- Date of coring and time,
- x and y coordinate locations (determined by DGPS) and/or offsets from the c or g core and elevation above pool,
- Offset distance from each bank for each core and height above or depth of water,
- Name of sample inspector/geologist,
- Sampling method,
- Depth below water to the top of sediments (River borings only),
- Total core length and discrete sample depth intervals and numbers,
- Detailed description of each strata that can be delineated within the core, including thickness and USCS designation,
- Depth to refusal or termination, and
- Any other relevant observations, such as the nature of the refusal material.

At the end of each day of sampling, all samples will be reorganized and placed back into coolers for shipment to GPL. The unique sample identification number and schedule of analyses for each sample shall be documented on chain of custody forms provided by GPL. A separate chain-of-custody shall be prepared to document the samples and requested analyses for every sample in each cooler being transported. The Field Sample Team Leader shall retain one copy of every chain of custody form. The Chain-of-Custody form will accompany all samples from the time of collection until the laboratory receives them. Each party in possession of the samples will be required to sign the Chain-of-Custody form signifying receipt. A copy of the original completed form will be provided by the laboratory along with the laboratory report of results.

2.5.2 Photographs

Photographs were not included in the project scope of work.

2.5.3 Sample Numbering System

Table B-2 depicts the system that will be used to uniquely identify each core boring and each sample. The transects are numbered 1 through 87. The borings in each transect are lettered sequentially a through i from the left bank to the right bank, as shown in Figure B-1. At fifteen transect locations, an additional upland core boring will be advanced, and it will be labeled u, regardless of which bank it comes from. The chemical samples within each boring will be numbered sequentially as 1, 2 and 3, (top, middle and bottom samples, respectively). At some boring locations more than three chemical samples may be collected, and in this case the sample numbering will follow the same convention.

Sample labels will be prepared in advance of the field work to include all pertinent information for the scheduled sampling and analyses, with the exception of sampler's name, sample date, time and depth interval, which shall be filled in at the time of collection. Each sample will be numbered to correspond to the Transect, boring and sample number depicted in Table B-2. In addition, each sample label will also include an acronym indicating the scheduled analyses according to the designations below.

'TRPH' = Discrete samples for TRPH only

'All' = Discrete samples for all parameters (TRPH, PAHs, PCBs, pesticides, herbicides and metals, including hexavalent chromium)

"Radioisotopes" - Composite samples for total alpha, beta and gamma

'U' = Brownfield = Upland Control = Composite samples for all parameters (TRPH, PAHs, PCBs, Pesticides, herbicides and metals, including hexavalent chromium)

'TCLP' = Composite samples for all Toxic Characteristics Leaching Procedure parameters

For instance, the unique sample number for the second discrete sample from the c boring in transect number 14 for analysis of TRPHs, PAHs, PCBs, pesticides, herbicides and metals, including hexavalent chromium is "14-c-2-A."

For organization and tracking purposes, the samples designated as 'A' or 'TCLP' will contain an additional acronym to uniquely identify each analysis performed within the respective analyte groups according to the list below.

T = Total Recoverable Petroleum Hydrocarbon Compounds

PAH = Polynuclear Aromatic Hydrocarbon Compounds

PCBs = Polychlorinated Biphenyl Compounds

PEST = Pesticides

HERB = Herbicides

MET = Target Analyte List Metals, including hexavalent chromium

For instance, the analysis for Target Analyte Metals performed on the sample listed above will be designated 14-c-2-A-MET. This unique numbering system for precise identification of each analysis method performed shall be strictly adhered to facilitate systematic organization of the very large set of data that will result from the project, as well as to provide a simple and accurate means to track planned versus actual analyses and accrued expenditures.

2.6 *Sample Transport and Storage*

All chemical samples to be analyzed will be placed on wet ice in a cooler as soon as practical after collection. Samples will be shipped by next day mail within 24 hours of the time of collection. Samples will be packaged to prevent breakage. Ice packs will be used to maintain a temperature of 4°C (+/- 2°C) in the coolers during shipping. Shipping containers will be monitored for temperature upon opening in the laboratory through the addition of a temperature blank to each sample cooler. Geotechnical samples will be shipped to DLZ Laboratories after half of the samples have been collected, and upon completion of the project sampling.

2.7 *Investigation Derived Waste Handling*

Minimal IDW is anticipated due to the sampling methods selected. Most of the waste is anticipated to come from three specific sources; spent personal protective equipment, unused portions of disposable sampling tubes and decontamination fluids. CELRP has indicated that Ohio EPA has granted permission to return all excess sediment and soil, including in-river core sediment, collected but not needed for analysis to be returned to the boring location.

However, the Altech geologist shall use professional judgment to containerize excess cuttings that will likely create a significant oil slick or otherwise mobilize significant amounts of contaminants.

All IDW generated during sampling will be collected at the point of generation and placed in 5-gallon buckets dedicated by waste stream, then transferred as needed to waste stream dedicated 55-gallon drums for temporary storage until waste characterization analysis results are returned. Decontamination solutions generated by the sediment sampling will be placed in five-gallon pails, and secure lids will be placed on these containers during transport from one transect location to another. Efforts will be made to keep IDW water generated by the above activities to a minimum.

An equipment trailer will accompany the crews to the river access location each day of field sampling. Three dedicated 55-gallon drums will be maintained on the trailer to collect the daily generated IDW. All 55-gallon drums will be clearly marked with the following statement, "Non-hazardous, Pending Analytical." Also, the outside of each drum will be clearly marked to indicate the waste stream and the date of generation.

A storage facility rented to store sampling equipment will be used for temporary storage of accumulated IDW drums and empty drums. Based on the results, each IDW waste stream will be transported and disposed in accord with all local, state and Federal regulations regarding the transport and disposal of waste. Final Certificates of Disposal shall be furnished to CELRP for all regulated IDW disposal.

2.8 *Contractor Chemical Quality Control*

The Field Sampling Team Leader is the on-site Chemical Quality Control representative and the individual responsible for applying the following three phase process for quality control. There is one definable work feature, collection of continuous core samples for visual observation and selection of discrete and composite soil and sediment samples for chemical and geotechnical laboratory analyses.

The tri-fold quality control process includes preparatory, initial and follow-up phases. Field sampling is scheduled to occur in two episodes, and the complete three-phase process will be utilized during both periods.

The preparatory phase will consist of an on-site pre-sampling meeting. Each member of the sampling team will be required to read the SAP prior to mobilization to the field. The Field Sampling Team Leader will direct the preparatory meeting, summarizing the:

- goals and objectives of the project;
- rationale for selecting transect, coring and sample interval locations;
- sampling and decontamination equipment and procedures;
- IDW management;
- documentation and record keeping;
- Sample packaging, transport and custody requirements; and
- Safety concerns and personal protective equipment and procedures.

The initial phase will consist of all three crews observing the collection and documentation of a continuous core sample at one or more locations to assure every individual in all three sampling crews clearly understands the procedures to be implemented. The follow-up phase will consist of periodic inspection by the Field Sampling Team Leader to assure all aspects of the sample collection and documentation conform to the requirements specified in this SAP.

Tables B-1 and B-2 will be used to track progress. As each scheduled sample is collected, it will be checked off Table B-2. Any scheduled location where a designated sample is not collected shall be circled, and a note added to the subsurface exploration record to explain why. All deviations from the planned sampling specified in these two tables will be clearly denoted in the Daily Chemical Quality Control Report by attaching the relevant pages from Table B-2. Each scheduled sample collected will be checked, and each scheduled sample not collected will be circled on the excerpt from Table B-2.

2.9 *Daily Chemical Quality Control Reports*

Daily Chemical Quality Control Reports (DCQCRs) will be submitted by the Field Sampling Team Leader to the Altech project office. Each DCQCR will include the date, weather conditions, a brief summary of the samples collected for that day and a description of any significant non-conformance with the scheduled sampling. Each CQCR shall be accompanied by either electronic or hard copies of all field subsurface exploration records, and the relevant excerpts from Table B-2, depicting samples scheduled and collected. Each CQCR shall also include chain of custody forms for all samples shipped from the site that day. Cumulative tallies will be maintained at the Altech project office of planned sampling to actual samples collected.

2.10 *Corrective Actions*

The detailed procedures for collecting samples and the three-phase quality control process are designed to prevent the need for corrective actions. However, regardless of the thoroughness of a plan or the level of field oversight implemented, there are numerous variables and conditions that occur in the field that may require a corrective action.

The geologist leading each sample crew shall closely communicate all concerns to the Field Sampling Team Leader. These two individuals shall mutually agree to a solution to any significant concern. If the issue cannot be resolved to the satisfaction of both, or if the issue could affect the quality of the data or the costs of the project, the Altech Senior Project Manager shall be consulted for resolution. If the Altech Senior Project Manager cannot resolve the issue, then it shall be elevated to the Altech QC Manager for resolution. If the Altech Senior Project manager and QC Manager cannot mutually resolve the issue, or it could affect product quality, cost or schedule, the issue shall be promptly conveyed to the CELRP Technical Manager for direction.

Whenever any significant nonconformance with the specified field sampling procedures is discovered, the nonconformance and corrective action shall be documented in the DCQCR. The GPL laboratory QC Manager will acknowledge every shipment of samples received on the day of receipt. Each chain-of-custody form will be closely checked relative to the samples received at the laboratory, and any samples listed but not received, or received but not listed, will be conveyed immediately to the Altech project office for documentation and follow-up with the Field Sampling Team Leader.

All actions necessary to produce the quantity and quality of data specified for the project shall be promptly implemented, and all corrective actions will follow the chain of command described above. However, issues resolved at the crew level will not require documentation unless there is a potential that the issue could affect product quality, schedule or budget.

2.11 *Project Schedule*

All field sampling activities are scheduled to be complete before July 4, 2003. The complete project schedule is presented in Appendix A.

2.12 *Sampling Apparatus and Field Instrumentation*

Two primary sampling techniques will be used to collect samples, direct push of Lexan™ tubes and manually driven Geoprobe Macro-core™ samplers. CEC is responsible for providing and maintaining all needed sampling equipment for the project. The only field instrumentation to be used will be a portable photoionization detector to monitor air quality for health and safety purposes during sampling. No field analyses are schedule to characterize chemical, physical or geotechnical properties.

3.0 Quality Assurance Project Plan

3.1 *Project Description*

The project description is provided in the PWP.

3.2 *Project Organization and Responsibilities*

GPL and DLZ National laboratories are responsible for conducting all laboratory analyses in accord with the designated methods and criteria. Altech is responsible for reviewing and checking the results for compliance with these criteria. The complete project organization, roles, responsibilities and lines of authority are described in Section 1 of the PWP and Appendix A, the QCP.

3.3 ***Data Quality Objectives***

3.3.1 Background

The object of the Quality Assurance Project Plan (QAPP) is to specify project specific quality criteria for laboratory measurements. The Corps of Engineers' EM 200-1-3 "Requirements for the Preparation of Sampling and Analysis Plans" provides the driving guidance for establishing the criteria and procedures to measure data quality. This QAPP is intended to comply with the criteria in EM 200-1-3 for the production of a Definitive Data Package; whereby, independent technical review can be conducted to verify that standard and project specific quality objectives have been met.

Section 6 of the PWP summarizes the data quality objectives (DQOs) for this project. The purpose of the DQO process is to define and then refine estimates of the type, quantity and quality of data needed to support properly informed project decisions. Establishment of the project specific DQOs is used in an iterative process to develop an optimal sampling and analysis plan, which balances the need for data with the cost of procuring it. The sampling and analyses specified in this SAP reflect revisions to the quantities and locations of samples for chemical analysis specified in the project scope of work.

3.3.2 QA Objectives for Chemical Data Measurement

The primary QA objective is to measure the concentration of analytes in each sample without unacceptable bias. The reliability and credibility of laboratory data generated for this project will be corroborated by the inclusion of a program of scheduled analyses of replicates (field and matrix duplicates), standard solutions, surrogate compound solutions and spiked samples, as described above and below.

Documentation of accomplishment of laboratory QC objectives is performed through assessment of Data Quality Indicators. These include Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity (PARCCS). A brief description of each of these data quality indicators is presented below. Table B-4 lists the chemical analyses by group and corresponding method of analysis. The criteria for sensitivity are specified in Table B-5 with the list of each specific target analyte by analysis group specified in Table B-4. The project specific criteria for Precision, Accuracy and Completeness are summarized for each method in Table B-6, based on the criteria specified in Appendix G of EM 200-1-3. Representativeness and comparability are qualitative criteria that will not be measured, but will be qualitatively assessed.

Table B-4 Target Analyte Groups and Corresponding USEPA SW-846 Analysis Methods

Analyte Group	USEPA/SW-846 Method
Total Recoverable Petroleum Hydrocarbons (TRPH)	418.1
Polynuclear Aromatic Hydrocarbon compounds (PAHs)	8270C
Polychlorinated Biphenyls (PCB)	8082
Herbicides	8151A
Pesticides	8081A
Target Analyte List Metals (TAL Metals)	6010B
Hexavalent Chromium	7196A
Toxic Characteristic Leaching Procedure (TCLP)	Uses Methods Above
Radioisotopes (Total alpha, beta & gamma)	900.0

3.4 *Sampling Locations and Procedures*

Sampling locations and procedures were developed by the CELRP Technical and Project Managers based on a variety of factors. Precise locations and specific procedures for procuring samples and decontaminating equipment are described in detail in Section 2 of this SAP and depicted in Figures B-1 through B-13 following the text.

3.5 *Sample Custody and Holding Requirements*

Sample Custody and holding requirements are specified in detail in Section 2, the FSP. Table B-3 is a summary of the container requirements for all sample types, which also indicates preservation and holding time requirements specific to each type of analysis to be performed. The laboratory shall promptly examine each sample shipment and complete a cooler receipt form for each cooler of samples received for the project. All samples shall be segregated and tracked within the lab in accordance with the GPL Quality Management Plan. Sample preservation, extraction and analyses shall conform with the holding time requirements of this SAP, EM 200-1-3, USEPA SW846 and the GPL Quality Management Plan.

3.6 *Laboratory Analytical Procedures*

Table B-4 lists the USEPA methods selected for analysis for this project, and Table B-5 provides the complete list of chemical analytes detectable under each method with the method detection and reporting limits for soil and water matrices for each specific analyte. The Standard Operating Procedures (SOPs) for each method are maintained at the laboratory.

Each method specific SOP details the standards, surrogates and QC criteria for accuracy, precision and sensitivity to evaluate process control, and determine if measured data is acceptable. Further, each method specific SOP specifies corrective action protocol to be implemented when measure data is outside the established QC criteria limits. Table B-6 presents the project specific Data Quality Objectives. The following is a brief summary of each analysis method to be employed.

3.6.1 Total Recoverable Petroleum Hydrocarbons (TRPH) – US EPA Method 418.1

Method 418.1 is an EPA method for measuring total petroleum hydrocarbons in samples of soil or water. Hydrocarbons are extracted from the sample using a chlorofluorocarbon solvent (typically Freon-113) and quantified by fourier transform infrared spectrophotometry or spectroscopy. The method specifies that the extract be passed through silica gel to remove the non-petroleum fraction of the hydrocarbons. Table B-5 depicts the specified method detection and reporting limits for TRPH.

3.6.2 Polynuclear Aromatic Hydrocarbons (PAHs) – SW 846 Method 8270C

Method 8270C is used to determine Polynuclear Aromatic Hydrocarbons (PAHs) compounds in extracts in a variety of solid and liquid matrices. The method utilizes capillary column Gas Chromatography coupled to a Mass Spectrometer. The list of PAH target analytes and the required method detection and practical quantitation limits applicable to this project for PAH compounds are presented in Table B-5.

3.6.3 Total Polychlorinated Biphenyls (PCB) – SW 846 Method 8082

SW-846 Method 8082 is used to quantify the concentrations of PCBs as individual Aroclors in extracts from solid and liquid matrices. The method utilizes fused-silica, open-tubular, capillary columns with electron capture detectors to differentiate individual aroclor compounds. Table B-5 provides a list of the specific PCB aroclor isomers detectable by the method along with the laboratory Method Detection Limit and Reporting Limits for each.

Table B-5 - Method Detection and Reporting Limits

USEPA SW846 Analytical Method	Chemical	Soil		Water	
		MDL (ug/Kg)	RL (ug/kg)	MDL (ug/L)	RL (ug/L)
Total Petroleum Recoverable Hydrocarbons (TRPH)					
418.1	TPH	N/A	500	0.29	0.5
Polynuclear Aromatic Hydrocarbons (PAH)					
8270C	Napthalene	38.5	330	1.18	10
8270C	Acenaphthylene	25.2	330	0.67	10
8270C	Acenaphthene	52.2	330	1.27	10
8270C	Fluorene	41.3	330	1.39	10
8270C	Phenanthrene	40.8	330	1.06	10
8270C	Anthracene	50.3	330	1.40	10
8270C	Fluoranthene	36.9	330	1.59	10
8270C	Pyrene	61.9	330	1.27	10
8270C	Benzo(a)anthracene	44.1	330	1.30	10
8270C	Chrysene	33.9	330	1.56	10
8270C	Benzo(b)fluoranthene	45.7	330	2.17	10
8270C	Benzo(k)fluoranthene	59.7	330	2.02	10
8270C	Benzo(a)pyrene	27.0	330	1.33	10
8270C	Indeno(1,2,3-cd)pyrene	33.1	330	1.63	10
8270C	Dibenzo(a,h)anthracene	37.3	330	1.65	10
8270C	Benzo(g,h,i)perylene	40.7	330	1.90	10
Total Polychlorinated Biphenyls (PCBs)					
8082	Aroclor 1016	3.75	33.3	0.15	1.0
8082	Aroclor 1221	15.7	33	0.75	1.0
8082	Aroclor 1232	9.9	33	0.38	1.0
8082	Aroclor 1242	4.6	33	0.48	1.0
8082	Aroclor 1248	7	33	0.11	1.0
8082	Aroclor 1254	7.2	33	0.16	1.0
8082	Aroclor 1260	2.91	33.3	0.22	1.0
Herbicides					
8151A	Dalapon	11.0	100	0.38	1.0
8151A	4-Nitrophenol	17.8	100	0.32	1.0
8151A	Dicamba	26.4	100	0.82	1.0
8151A	MCPA	31800	100000	39.7	100
8151A	Dichloroprop	65.3	100	0.18	1.0
8151A	2,4-D	15.2	100	0.33	1.0
8151A	MCPP	16700	100000	35.5	100
8151A	Pentachlorophenol	11.1	100	0.28	1.0
8151A	2,4,5-TP (Silvex)	13.7	100	0.24	1.0
8151A	2,4,5-T	17.5	100	0.21	1.0
8151A	2,4-DB	26.0	100	0.35	1.0
8151A	Dinoseb	21.4	100	0.71	1.0
Pesticides					
8081A	gamma-BHC (Lindane)	0.11	1.7	0.0048	0.05
8081A	Heptachlor	0.34	1.7	0.0077	0.05

Table B-5 - Method Detection and Reporting Limits

USEPA SW846 Analytical Method	Chemical	Soil		Water	
		MDL (ug/Kg)	RL (ug/kg)	MDL (ug/L)	RL (ug/L)
8081A	Aldrin	0.10	1.7	0.0049	0.05
8081A	beta-BHC	0.11	1.7	0.0051	0.05
8081A	delta-BHC	0.15	1.7	0.0048	0.05
8081A	Heptachlor Epoxide	0.10	1.7	0.0051	0.05
8081A	Endosulfan I	0.12	1.7	0.0052	0.05
8081A	gamma-Chlordane	0.10	1.7	0.0053	0.05
8081A	alpha-Chlordane	0.27	1.7	0.0049	0.05
8081A	4,4-DDE	0.14	1.7	0.0052	0.05
8081A	Dieldrin	0.23	1.7	0.0049	0.05
8081A	Endrin	0.15	1.7	0.0053	0.05
8081A	Endosulfan II	0.63	1.7	0.0027	0.05
8081A	4,4-DDD	0.15	1.7	0.0052	0.05
8081A	4,4-DDT	0.61	1.7	0.0110	0.05
8081A	Endrin Aldehyde	0.19	1.7	0.0070	0.05
8081A	Endosulfan Sulfate	0.19	1.7	0.0054	0.05
8081A	Methoxychlor	0.47	1.7	0.0075	0.05
8081A	Endrin Ketone	0.15	1.7	0.0064	0.05
Target Analyte (TAL) Metals					
6010B	Alumium	1.44	20	15.6	200
6010B	Antimony	0.34	2.0	3.2	20
6010B	Arsenic	0.33	2.0	3.4	20
6010B	Barium	0.02	0.50	0.2	5.0
6010B	Beryllium	0.010	0.20	0.1	2.0
6010B	Cadmium	0.03	0.60	0.3	6.0
6010B	Calcium	7.30	100	102	1000
6010B	Chromium	0.05	0.50	0.4	5.0
6010B	Cobalt	0.05	0.50	0.4	5.0
6010B	Copper	0.13	1.0	0.8	10
6010B	Iron	2.09	15	11.2	150
6010B	Lead	0.16	1.0	2.2	10
6010B	Magnesium	1.42	25	16.6	250
6010B	Manganese	0.06	0.50	0.3	5.0
6010B	Mercury	0.02	0.03	0.1	0.2
6010B	Nickel	0.15	1.0	1.1	10
6010B	Potassium	1.11	25	55.2	250
6010B	Selenium	0.22	2.0	1.9	20
6010B	Silver	0.05	0.30	0.3	3.0
6010B	Sodium	9.02	250	208	2500
6010B	Thallium	0.33	3.0	3.6	30
6010B	Vanadium	0.07	1.0	0.5	10
6010B	Zinc	0.25	2.0	3.0	20
Hexavalent Chromium					
7196A	Hexavalent Chromium	130	400.00	N/A	10
***TCLP**					
8260	1,4 Dichlorobenzene	0.33	100	0.33	100

Table B-5 - Method Detection and Reporting Limits

USEPA SW846 Analytical Method	Chemical	Soil MDL (ug/Kg)	Soil RL (ug/kg)	Water MDL (ug/L)	Water RL (ug/L)
8260	1,2 Dichlorobenznene	0.33	100	0.33	100
8260	Chlorobenzene	0.39	100	0.39	100
8260	Tetrachloroethylene	1	100	1	100
8260	Carbon Tetrachloride	0.77	100	0.77	100
8260	Chloroform	0.44	100	0.44	100
8260	Benzene	0.47	100	0.47	100
8260	Vinyl Chloride	0.92	100	0.92	100
8260	1,1 Dichloroethene	0.57	100	0.57	100
8260	2-Butanone	1.15	100	1.15	100
8260	Trichloroethene	0.46	100	0.46	100
8270	1,4 Dichlorobenzene	0.87	10	0.87	10
8270	2,4,5 - Trichlorophenol	1.71	10	1.71	10
8270	2,4,6 - Trichlorophenol	2.3	10	2.3	10
8270	2,4-Dinitrotoluene	1.56	10	1.56	10
8270	2-Methylphenol	2.29	10	2.29	10
8270	3 & 4 - Methylphenol		10		10
8270	Hexachlorobenzene	0.74	10	0.74	10
8270	Hexachlorobutadiene	0.69	10	0.69	10
8270	Hexachloroethane	1.08	10	1.08	10
8270	Nitrobenzene	0.87	10	0.87	10
8270	Pentachlorophenol	2.01	20	2.01	20
8270	Pyridine	0.87	10	0.87	10
8081	Chlordane	0.0049	5	0.0049	5
8081	Endrin	0.0053	0.25	0.0053	0.25
8081	gamma-BHC (Lindane)	0.0048	0.25	0.0048	0.25
8081	Heptachlor	0.0077	0.25	0.0077	0.25
8081	Heptachlor Epoxide	0.0051	0.25	0.0051	0.25
8081	Methoxychlor	0.0075	0.25	0.0075	0.25
8081	Toxaphene		5		5
8151	2,4,5-TP (Silvex)	0.24	5	0.24	5
8151	2,4-D	0.21	5	0.21	5
6010	Arsenic	3.4	200	3.4	200
6010	Barium	0.2	1000	0.2	1000
6010	Cadmium	0.3	60	0.3	60
6010	Chromium	0.4	50	0.4	50
6010	Lead	2.2	100	2.2	100
6010	Selenium	1.9	200	1.9	200
6010	Silver	0.3	30	0.3	30
7470	Mercury	0.1	2	0.1	2
Radioisotopes					
	alpha	1 pCI/g		NA	NA
	beta	1pCI/g		NA	NA
	gamma	0.5pCI/g		NA	NA

* PLEASE NOTE for the TCLP compounds all results will be reported in aqueous units and Detection Limits will be the same at aqueous samples for the compounds listed.

3.6.4 Herbicides - SW-846 Method 8151A

Method 8151A is a capillary gas chromatographic method for determining certain chlorinated acid herbicides and related compounds in solid and liquid matrices. The list of herbicide analytes and the required method detection and practical quantitation limits applicable to this project are presented in Table B-5.

3.6.5 Pesticides – SW 846 Method 8081A

Method 8081A is used to identify and quantify the concentrations of organochlorine Pesticides in extracts from solid and liquid matrices using capillary columns with electron capture detectors. The list of pesticide analytes and the required method detection and practical quantitation limits applicable to this project are presented in Table B-5.

3.6.6 Target Analyte (TAL) Metals – SW 846 Method 6010B

SW-846 6000/7000 Series methods are used to determine the presence of various metals in extracts from solid and liquid matrices. The inorganic analyses will employ inductively-coupled plasma - atomic emission spectrometry (ICP) and cold vapor-atomic absorption methodologies to identify and quantify the concentration of metals in soil. Metals analyses will include the USEPA Target Analyte List (TAL) metals. Table B-5 lists each metal analyte and the corresponding laboratory Method Detection Limit and Reporting Limit for each.

3.6.7 Hexavalent Chromium - SW 846 Method 7196A

Method 7196A is a colorimetric laboratory procedure used to determine the concentration of hexavalent chromium in TCLP extracts, groundwater and extracts from soil and sediments using USEPA SW-846 Method 3060. The method detection and practical quantitation limits for hexavalent chromium for this project are presented in Table B-5.

3.6.8 Toxic Characteristic Leaching Procedure (TCLP) Full List

The Toxic Characteristic Leaching Procedure (TCLP) is used to determine if a solid waste is classified as a "hazardous waste" under RCRA. The procedure is intended to simulate the acidic conditions that can occur during the life of a landfill, which can leach metals and organic compounds from a solid matrix and potentially contaminate groundwater and/or surface water. Subsequent to the leaching procedure, the extract is analyzed according to the USEPA Method corresponding to the type of chemical compound or element.

3.6.9 Radioisotopes (alpha, beta & gamma)

Selected samples will be subjected to laboratory analysis for gross alpha, beta and gamma radiation. GPL has subcontracted this component of the analysis to Pace Analytical Services, Inc. Gross alpha/beta analysis will be performed according to method 900.0/SOP PGH-R-001-A. Gamma radiation will be measured by method HASL 300/SOP RA-100. These analyses are screening level measurements with very low detection levels for total alpha, beta and gamma activity. They are designed to indicate if analysis for specific element or ion species is warranted. Due to the method sample preparation requirements, the sample is oven dried prior to analysis. Therefore, volatile radioisotopes potentially present in a sample are not measured.

Table B-6 Summary of Project Specific Data Quality Objectives

Analytical Method	Matrix	Sample Type	Number of Field Samples	Number of Field QA/ QC Samples	Analytical Level	Precision (RPD)[1] Field Dups	Precision (RPD)[1] Lab Dups	Laboratory Accuracy Recovery %	Sensitivity[2]	Completeness[3]
418.1 TRPH	Solid	Discrete Composite	1509 15	75 1	Level III	3x	15%	75 - 125%	See Table B-5 for analyte specific Reporting Limits and Method Detection Limits	95%
418.1 TRPH	Water	Grab	19	1	Level III	3x	15%	75 - 125%		95%
8270C PAH	Solid	Discrete Composite	378 15	19 1	Level III	4x	60%	MS 45-135% Surrogates 60-120% B/N Cmpds 60-120% A Cmpds		95%
8270C PAH	Water	Grab	19	1	Level III	2x	50%	MS 45-135% Surrogates 60-120% B/N Cmpds 60-120% A Cmpds		95%
8082 PCBs	Solid	Discrete Composite	378 15	19 1	Level III	4x	50%	MS 40-140%		95%
8082 PCBs	Water	Grab	19	1	Level III	2x	50%	MS 40-140%		95%
8051 Herbicides	Solid	Discrete Composite	378 15	19 1	Level III	4x	25%	MS 10 - 150% Surrogates 29-143%		95%
8051 Herbicides	Water	Grab	19	1	Level III	2x	25%	MS 10 - 150% Surrogates 29-143%		95%

Table B-6 Summary of Project Specific Data Quality Objectives

Analytical Method	Matrix	Sample Type	Number of Field Samples	Number of Field QA/ QC Samples	Analytical Level	Precision (RPD)[1]		Laboratory Accuracy Recovery %	Sensitivity[2]	Completeness[3]
						Field Dups	Lab Dups			
8081A Pesticides	Solid	Discrete Composite	378 15	19 1	Level III	4x	<50%	MS 40-140% Surrogates 40-140%	See Table B-5 for analyte specific Reporting Limits and Method Detection Limits	95%
8081A Pesticides	Water	Grab	19	1	Level III	2x	<50%	MS 40-140% Surrogates 40-140%		95%
6010B Metals	Solid	Discrete Composite	378 15	19 1	Level III	2x	<25%	MS 75-125% PDS Spike 75-125% Surrogates 40-140%		95%
6010B Metals	Water	Grab	19	1	Level III	2x	<25%	MS 75-125% PDS Spike 75-125% Surrogates 40-140%		95%
7196A Hexavalent Chromium	Solid	Discrete Composite	378 15	19 1	Level III	2x	<25%	MS 75-125% PDS Spike 75-125% Surrogates 40-140%		95%
7196A Hexavalent Chromium	Water	Grab	19	1	Level III	2x	<25%	MS 75-125% PDS Spike 75-125% Surrogates 40-140%		95%

[1]RPD = Relative Percent Difference

[2]Refer to analytical method for compound specific limits

[3]Completeness criteria applies to samples submitted for laboratory analysis. No completeness criteria is specified for the percentage of budgeted samples actually collected.

3.7 *Calibration Procedures and Frequency*

All laboratory instruments used to identify and measure the concentration of chemicals will be calibrated in accord with the manufacturer's recommendations and the requirements of USEPA SW-846. Initial calibration, initial calibration verification and continuing calibration analyses will be performed in accordance with the frequency requirements in SW-846 and the laboratory SOP for each method. The laboratory shall maintain detailed records documenting supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date and any other relevant information to each standard solution use for instrument calibration.

Balances and refrigerators are systematically monitored daily and adjusted as necessary to maintain accuracy and precision. The laboratory water supply system is designed and monitored to deliver ASTM Type II "polished water" to the various analytical areas. No field instruments will be used to measure chemical concentrations in sediment samples.

3.8 *Internal Quality Control Checks*

3.8.1 Field Quality Control Checks

One of twenty samples collected for this project will be taken in duplicate. MS/MSD analyses will be batch at a rate of one MS/MSD analyses for each 20 field samples.

3.8.2 Laboratory Quality Control Checks

GPL will follow internal QC checks required under the SW-846 methodologies, the GPL Standard Operating Procedures, and EM 200-1-3.

There are two types of quality assurance used by GPL: program quality assurance and analytical quality control. GPL follows written quality assurance programs for each analysis method, which provide procedural rules and guidelines to monitor and control the reliability and validity of work conducted at the laboratory. Compliance with the GPL QA programs is coordinated and monitored by the laboratory's Quality Assurance Officer (QAO), who is independent of the operating departments. The stated objectives of the laboratory QA program are to:

1. Ensure that all procedures are documented, including any changes in administrative and/or technical procedures.

2. Ensure that all analytical procedures are conducted according to sound scientific principals and have been validated.

3. Monitor the performance of the laboratory by a systematic inspection program and provide for corrective action as necessary.

4. Ensure that all data are properly recorded and archived.

All laboratory procedures are documented in writing and are controlled by the QAO. Internal quality control procedures for analytical services will be conducted by the laboratory in accordance with its SOPs and the individual method requirements in a manner consistent with the GPL QA programs. These specifications include the types of audits required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each audit, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria for these audits.

In each data package provided, GPL will document that both initial and ongoing instrument calibration and critical analytical QC functions (such as lab method blanks and LCS recovery) have been met. Any samples analyzed in non-conformance with the critical QC criteria will be reanalyzed by the laboratory.

3.9 *Calculation of Data Quality Indicators*

Precision and accuracy will be determined using MS/MSD analysis. SW-846 QA/QC criteria will be used to evaluate precision and accuracy and data verification. Precision and accuracy data will be used to determine completeness or percentage of usable points. Data validation will be conducted by Altech.

3.9.2.1 Precision

Spiked samples will be prepared by using the batch MS/MSD samples provided to the laboratory, dividing the samples into equal aliquots, and the spiking each of the aliquots with a known amount of analyte. The duplicate samples are then included in the analytical sample set. The splitting of the samples allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate sample. The RPD between the spike and duplicate spike are calculated and plotted. The RPD is calculated according to the following formula:

RPD = {absolute value of (X1-X2)/[(X1+X2)/2]} * 100%

Where X1 = Concentration in replicate 1

X2 = Concentration in replicate 2

3.9.2.2 Accuracy

In order to assure the accuracy of the analytical procedures, an environmental sample is randomly selected from each analytical batch of samples prepared/analyzed, and spiked with a known amount of the analyte or analytes to be evaluated. A MS, as well as an LCS, will be included in every set of 20 samples analyzed on each instrument. The spike samples and LCS are then analyzed. The increase in concentration of the analyte observed in the spiked sample or LCS due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the unspiked sample or clean matrix, determines the percent recovery. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%R = [(Xs - Xu)/K] * 100\%;$$

where

Xs = Measured Concentration in the Spiked Sample
Xu = Measured Concentration in the Unspiked Sample
K = Known amount of spike in the sample

3.9.2.3 Representativeness

<u>Representativeness</u> of data collection is addressed by careful preparation of sampling programs that specify sufficient and proper numbers, frequency, and locations of samples, so as to assure that sample data accurately and precisely represent selected characteristics of media sampled. Strict adherence to the methods and equipment prescribed in this SAP to collect, store and transport samples are very important in maintaining the representativeness of the collected samples to actual field conditions.

3.9.2.4 Completeness

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analytical procedure. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\%C = (V/N) * 100\%$$

Where;

V = Number of measurements judged valid

N = Total Number of samples submitted for analysis

3.9.2.5 Comparability

In order to establish a degree of comparability such that observations and conclusions can be directly compared with historical and/or available background data, standardized methods of field analysis, sample collection, holding times, and sample preservation will be used.

3.9.2.6 Sensitivity

Sensitivity is a term broadly applied to the detection capabilities of the methods and instruments used to conduct the scheduled analyses. In general, Method Detection Limits (MDLs) are the concentrations, above which, a specific compound or group of compounds will be detected at a confidence level of 95%. Likewise, the Reporting Limit (RL) is a concentration value generally two to three times higher than the MDL, above which a specific compound or group of compounds can be quantified within method specific precision and accuracy criteria.

The sampling and analysis methods selected for this project are designed to maintain the lowest reasonably achievable MDLs and RLs, which are generally well below Ohio EPA published Generic risk-based Concentration Number (GCN) values. The Ohio EPA GCN values are used as generic cleanup standards under the Ohio Voluntary Action Program, and along with the Model Reach conditions, they are the most relevant criteria for establishing project sensitivity requirements.

3.10 *Corrective Actions*

This Section describes the corrective action procedures to be used by Altech and the laboratory. Corrective action may be required for two classes of problems: analytical and equipment problems, and noncompliance problems. Analytical and equipment problems may occur during sampling, sample handling, sample preparation, analysis, and data review.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the Altech Project Manager who will then notify the USACE as needed. Implementation of corrective action will be confirmed in writing through the same channels.

Any nonconformance with the established laboratory QC procedures in this QAPP will be identified and corrected as specified here. Laboratory corrective actions will be documented on a Non-Conformance and Disposition Report. No staff member will initiate corrective action without prior communications of findings through the proper channels. If corrective actions are insufficient, work may be stopped by a stop-work order directed by the Altech and/or CELRP Project Managers.

3.10.1 Field Corrective Action

Corrective actions that relate to field sampling will be implemented and documented in the field record book and the Daily Chemical Quality Control Reports. Technical staff and project personnel will be responsible for reporting all suspected technical or QA non-conformance or suspected deficiencies or any activity-issued document by reporting the situation to the Altech Project Manager. The Altech Project Manager will be responsible for assessing the suspected problem and consulting with the GPL QAO regarding the potential for the situation to impact the quality of the data. If it is determined that the situation may result in nonconformance with the project requirements and will require any significant corrective action, the CELRP Technical Manager will be promptly notified and a nonconformance report will be initiated by the Altech Project Manager.

The Altech Project Manager will be responsible for all corrective actions initiated by:

1. Evaluating all reported non conformances;
2. Controlling additional work on non-conforming items;
3. Determining disposition or action to be taken;
4. Maintaining a log of non-conformances;
5. Reviewing non-conformance reports and corrective actions taken; and
6. Ensuring non-conformance reports are included in the final documentation and project files.

If appropriate, the Altech Project Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed. The Altech Project Manager is responsible for controlling, tracking, and implementation of the identified changes. Reports on all charges will be distributed to all affected parties.

3.10.2 Laboratory Corrective Actions

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is dependent on the analysis and the event.

Laboratory personnel are alerted that corrective actions may become necessary if:

1. QC data are outside the warning or acceptable windows for precision and accuracy;
2. Blanks contain target analytes above acceptable levels;
3. Undesirable trends are detected in spike recoveries or RPD between duplicates;
4. There are unusual changes in detection limits;
5. Deficiencies are detected by the GPL QAO during internal or external audits or from the results of performance evaluation sample analysis;
6. LCS recoveries are outside control limits; or
7. Inquiries concerning data quality are received.

3.10.3 Corrective Actions During Data Validation and Data Assessment

The Altech Project and QA Managers may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples or sample extracts by the laboratory.

These actions are dependent upon the ability to mobilize the field team, and whether the data to be collected are necessary to meet the required quality assurance objectives (e.g., the holding time for samples is not exceeded, etc.) When the GPL QAO identifies a corrective action situation with budget and schedule implications, it is the USACE Project Manager who will be responsible for approving the implementation of corrective actions.

3.11 *Inter- Laboratory Reconciliation*

Not applicable.

3.12 *Data Reduction, Validation, and Reporting*

This section describes reduction, validation and reporting for field activities and laboratory analyses. The data reduction, validation, and documentation process for laboratory data will begin at the analytical laboratory. All raw data will be checked and verified by the laboratory in three stages of data review.

The Altech Project Manager will review all chemical data received from the analytical laboratories prior to its inclusion in the Project Report to verify that it reasonably reflects known or expected conditions. The raw data collected from the project sampling tasks and used in project reports will be appropriately identified and included in a separate appendix of the Project Report.

Altech will conduct data validation. All aspects of the sampling and analysis program will be considered during the data validation process. The validation process will involve the evaluation of instrument performance and QC sample analysis data. The data validation report will summarize Data Quality Indicators (DQI). A summary table of all qualified data will be developed based on the data validation results.

3.12.4 Field Data Reduction and Validation Procedures

Not applicable - no field analyses.

3.12.5 Contractor Laboratory Data Reduction and Validation Procedures

GPL will perform data reduction and validation under the direction of the GPL QAO. The GPL QAO is responsible for assessing data quality in conformity with in-house data review procedures and the requirements of this QAPP.

The data validation process consists of data generation, reduction, and three levels of review. Data reduction procedures, whether performed by the instrument or manually, shall follow methodologies outlined within laboratory SOPs. Automated procedures shall be verified as required by USEPA guidance on Good Automated Laboratory Practices (GALP), i.e, all software shall be tested with a sample set of data to verify its correct operation via accurate capture, processing, manipulation, transfer, recording, and reporting of data.

All analytical data generated are extensively checked for accuracy and completeness. Each step of this review process involves evaluation of data quality based on both the results of the QA data and the professional judgment of those conducting the review.

The analyst who generates the analytical data has the prime responsibility for the correctness and completeness of the data. All data are generated and reduced following protocols specified in laboratory SOPs. Each analyst reviews the quality of his work based on an established set of guidelines. The review criteria as established in each method in the laboratory shall be used. The analyst reviews the data package to ensure that:

1. Sample preparation information is correct and complete.
2. Analysis information is correct and complete.
3. The appropriate SOPs have been followed.
4. Analytical results are correct and complete.
5. Raw data, including all manual integrations, have been correctly interpreted.
6. QC samples are within established control limits.
7. Special sample preparation and analytical requirements have been met.
8. Data transfers were verified.
9. Documentation is complete (e.g., all anomalies in the preparation and analysis have been documented; holding times are documented, etc.)

The data reduction and validation steps are documented, signed, and dated by the analyst. This initial review step, performed by the analyst, is designated as the Level 1 review. The analyst then passes the data package to an independent reviewer who performs a Level 2 review.

The level 2 review is performed by a data review specialist, or peer whose function is to provide an independent review of the data package. This review is also conducted according to an established set of guidelines and is structured to ensure that:

1. All appropriate laboratory SOPs have been referenced.
2. Calibration data are scientifically sound, appropriate to the method and completely documented,

3. QC samples are within established guidelines.
4. Qualitative identification of sample components is correct.
5. Quantitative results, including calculations and any associated flags, are correct.
6. Raw data, including manual integrations, have been correctly interpreted.
7. Documentation is complete and correct (e.g., anomalies in the preparation and analysis have been documented; out-of-control forms are complete, if required; holding times are documented, etc.)
8. The data are ready for incorporation into the final report.

The level 2 review is structured so that all calibration data and QC sample results are reviewed and all of the analytical results are checked back to the raw data or bench sheet. If no problems are found with the data package, the review is complete. If any problems are found with the data package, than all sample results shall be returned to the analyst and rechecked.

An important element of the Level 2 review is the documentation of errors that have been identified and corrected during the review process. Data packages submitted by the analyst for Level 2 review should be free of errors. Any errors that are found are documented and transmitted to the analyst/team. The cause of each error is then addressed with additional training or clarification of procedures to ensure that quality data will be generated at the bench. The Level 2 data review is also documented on a checklist with the signature of the reviewer and the date.

Level 3 administrative data review is performed by the program administrator or designee at the laboratory. Level 3 review provides a total overview of the data package, including sample receipt, to ensure its consistency and compliance with this QAPP and all internal laboratory procedures. All errors noted shall be corrected and documented. Based on the errors noted, samples may need to be re-prepared and re-analyzed. Level 3 administrative reviews shall also be documented on a checklist with the signature of the reviewer and date of review. The data package is then approved, dated, and signed by the GPL QAO and submitted to Altech.

A separate QA review, which is not part of the normal production data review process, would typically be performed by the GPL QAO or QA branch on at least ten percent of the data produced by the laboratory. The procedures outlined in the Level 3 data review would be followed, along with additional technical details from Levels 1 and 2. A total package review shall be performed for correlation of results from differing, but related, chemical parameters. The data packages reviewed shall be randomly selected by the GPL QAO, and Nonconformance Reports are required for any errors noted.

3.12.6 Altech Data Reduction and Validation Procedures

Data reduction will consist of tabulating only those data reported above the RL. All reduced data will be validated. Compound concentrations detected in field or method blanks will not be subtracted from other sample results. Data validation will be performed by Altech. The validation will include review of the entire "Definitive Data Package" provided by GPL and a comparison of surrogate recoveries for precision and matrix spike and matrix spike duplicate analysis results for accuracy in accord with the project specific data quality objectives presented in Table B-6. As part of the data validation process, Altech will utilize an

Automated Data Reporting system to perform systematic checks of the QC measurements for quantifying data precision and accuracy relative to the criteria specified in Table B-6 and to flag out of control results.

Representativeness, Completeness and Comparability will be validated by checking cooler receipt forms, temperature blank results, extraction and analysis dates, and conformance to the other precision, accuracy and sensitivity criteria defined in Table B-5. A complete check of all Method Detection and Reporting Limits will be conducted to assure the analyses met the project specific sensitivity criteria and that all Reporting limits remained below the model reach concentrations.

A Data Validation Report shall be prepared that explains each element of the Data Validation process and summarizes the results. It will include general and batch-specific case narratives summarizing the analyses performed, an explanation of out of control results, statement of qualifications to the data and a determination and explanation for all rejected data. A set of summary data tables will be prepared to illustrate the results of the data validation process. The result will be a comprehensive data set that meets the project specific DQOs and is usable to support characterization of the in-river and bank sediments and soils within the boundaries of the project. The validated data will be organized into a set of tables to aid presentation and review.

The acceptance criteria for blind duplicate sample results are prescribed in EM 200-1-6, "Chemical Quality Assurance for HTRW Projects" and summarized below. For all analytical parameters, if one duplicate sample result is less than the method detection limit for the analysis, the other sample result must be 5 times greater than the method detection limit for the results to be considered in disagreement and 10 times greater to be considered in major disagreement. Likewise for all analytical parameters, if one sample result is less than the reporting or practical quantitation limit for the analysis, the other sample result must be 3 times greater than the reporting limit for the results to be considered in disagreement and 5 times greater to be considered in major disagreement.

When comparing duplicate sample results for metals, where both samples are determined to have concentrations above the reporting limit, the results will be considered in disagreement if one sample is more than double the concentration of the other. They will be considered in major disagreement if one is 3 or more times the other.

For all other analytical parameters where both duplicate samples are determined to have concentrations above the reporting limit, the results will be considered in disagreement if one sample is more than 4 times the concentration of the other. They will be considered in major disagreement if one is 5 or more times the other.

3.12.7 Data Reporting

All data generated from laboratory analyses shall be reported in accordance with the definitive data package format, as described in EM 200-1-3. The data package should include a cover sheet, table of contents, case narrative, the analytical results, sample management records, and internal laboratory QA/QC information.

The results for each sample should contain the following information at a minimum (information need not be repeated if noted elsewhere in the data package)

- Laboratory name and location (city and state)
- Project name and unique ID number
- Field sample ID number as written on custody form
- Laboratory sample ID number
- Matrix (soil, water, oil, etc.)
- Sample description
- Sample preservation or condition at receipt
- Date sample collected
- Date sample received
- Date sample extracted or prepared
- Date sample analyzed
- Analysis time when holding time limit < 48 hours
- Method (and SOP) numbers for all preparation, cleanup, and analysis procedures employed
- Preparation, analysis and other batch numbers
- Analyte or parameter
- Method reporting limits adjusted for sample-specific factors (e.g. aliquot size, dilution/concentration factors, moisture content)
- Method quantitation limits (low-level standard concentrations)
- Method detection limits
- Analytical results with correct number of significant figures
- All confirmation data (refer to method reporting limits)
- Any data qualifiers assigned

- Concentration units
- Dilution factors – All reported data shall reflect any dilutions or concentrations. The dilution factor, if applicable, should be noted on the analytical report. If neat or diluted results are available, data from both runs should be recorded and reported.
- Percent moisture or percent solids (all soils, sediments, sludges, etc. are to be reported on a dry weight basis)
- Chromatograms, as needed
- Sample aliquot analyzed
- Final extract volume

The reporting limit used by the laboratory must be well defined. The lowest value reported by the laboratory as a non-detect shall be no lower than the method detection limit check sample (about two times the method detection limit.)

The minimum data package must include the calibration, calibration verification, and internal laboratory QA/QC data with their respective acceptance criteria. The data package should also include the laboratory's method quantitation and reporting limits for project specific parameters. The calibration data shall include a summary of the initial calibration curve, ICV, all calibration verification standards, and any performance standards analyzed in conjunction with the test method. All calibration deviations shall be discussed within the case narrative. The data package should correlate the method QC data with the corresponding environmental samples on a per preparation batch basis with batch numbers clearly shown. Method QC data must include all spike target concentration levels, the measured spike concentration and calculated recoveries; all measures of precision, including RPD; and all control limits for bias, and precision. This would include laboratory performance information such as result for method blanks, recoveries for LCSs, and recoveries for QC sample surrogates; and matrix-specific information such as MS and MSD recoveries, MS/MSD RPDs, field sample surrogate recoveries, serial dilutions and post digestion spikes, etc. At a minimum, internal quality control samples should be analyzed and reported at rates specified in the specific methods, with USACE guidance. Any deviations from the method quality objectives should be noted. Data review, non-conformance, or corrective action forms should be included within the data package. All analysis shall be performed on a schedule that will be consistent with both the Dredging Guidelines and the required holding

4.0 References

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Table B-1 - Sampling and Analysis Plan Summary

Transect No.	Original Transect No.		River Mile (r.m.)	OHW Offset from Shore Left	OHW Offset from Shore Right	Estimated Free flowing (F) or Pooled (P)	OHW Above Pool	Refusal Depth @ Shore Line			*Analyses groups scheduled	Notes and Observations
1	**1**	**Lab**	**46.2**	**30'**	**15'**	**P**	**3**	**LB**	**-**	**5'**	**A, TCLP**	**Diagonal from Stake on LB to doghouse on right.**
Leavittsburg - Leavitt Street Dam - River Mile 46.18												
2	1	Obs	46.1	30'	15'	F	9	LB	-	5'	B, T*	Cut across d.s of log jam to get small terrace, app 1000 ft ds. dam
3	2	Obs	45.8	Very Steep. No intermediate bank boring.	Very Steep. No intermediate bank boring.	F	8		-		B, T*	4446 Meadowbrook. Approx. 100' d.s. Bechtel Road on LB .
4	**2**	**Lab**	**45.14**	**15'**	**40'**	**P**	**6**	**LB**	**-**	**3'**	**A, TCLP**	**Approx. 500 ft u.s. Of Lovers Lane Dam**
Leavittsburg - Lovers Lane Dam - River Mile 45.13												
5	4	Obs	45.1	25'	50'	F	8	LB	-	2'	T*	Approx. 700 d.s. of Lovers Lane Dam.
6	**5**	**Obs**	**44.6**	**Very steep bank.**	**30'**	**F**	**7**		**-**	**6"**	**T***	**Approx. 20' u.s. of 2 small tribuitaries (OK to move).**
7	7	Obs	44.1	15'	25'	P	6		-		A, B, TCLP	Just upstream of concrete rubble on LB, App 500 ft us. Rt 422 Bridge.
8	8	Obs	43.8	Steep	Steep	P	6		-		T*	Locate in best spot u.s. of trib/outfall? On LB. Was not marked on recon trip.
9	**3**	**Lab**	**43.4**	**Steep**	**Steep**	**P**	**5**		**-**		**T**	**Marked in field but may relocate u.s. to maximize low terrace bank, us Copperwield Lagoon outfall.**
10	9	Obs	43.2	30'	Steep 10	P	4	RB	-	3'	T*	Located behind apartments.
11	4	Lab	42.8			P	4				T*	Not located in recon. Field locate in maximum low terrace bank area, @ Copperwield Sludge Pits, u.s. of dam.
12	10	Obs	42.6	10'	< 10'	P	6	RB	-	2'	T*	OHW just above erosion level. Approx. 200' u.s. LB dam and 20' u.s. RB dam.
Warren - North River Road Dam - River Mile 42.55												
13	11	Obs	42.5	50'	20'	F	6	RB	-	2'	T*	Approx. 500-600' d.s.of dam,
14	**5**	**Lab**	**42.2**	**30'**	**30'**	**F**	**6**	**RB**	**-**	**2'**	**T**	**Located behind ball park, app 1700 ft d.s. Dam.**
15	**6**	**Lab**	**41.6**	**60'**	**10'**	**P**	**6**		**-**		**T**	**May want to go d.s 100-200' of lath mark, app 250 ft u.s. of road bridge.**
16	**7**	**Lab**	**41**	**40'**	**60'**	**P**	**6**		**-**	**6'**	**A, TCLP**	**Approx.100' d.s. of foot bridge in Packard Park.**
17	12	Obs	40.6	15'	Steep fill	**P**	**5**		-	4'	T*	Note may move, in Packard Park
18	**8**	**Lab**	**40.4**	**20'**	**15'**	**P**	**5**		**-**	**8'**	**T**	**Very wide spot in river. Small island wetland - cut transect across island.**
19	**9**	**Lab**	**40.1**			**P**	**4**				**T**	**Not located in field. Maximize low terrace bank, approx. 200 ft u.s. dam.**

Bold=Lab samples
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T=TRPH
T*=TRPH from c and g cores
R=Radioisotopes
B=Brownfield upland control
TCLP=Toxic Characteristic Leaching Procedure

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Transect No.	Original Transect No.		River Mile (r.m.)	OHW Offset from Shore		Estimated Free flowing (F) or Pooled (P)	OHW Above Pool	Refusal Depth @ Shore Line			*Analyses groups scheduled	Notes and Observations
				Left	Right							
Warren - Summit Street Dam - River Mile 40.05												
20	13	Obs	39.9	60'	Steep fill	F	8		-		**T***	In Perkins Park u.s.end. Approx. 400' d.s. Of Summit St.bridge. Stake on left bank.
21	**10**	**Lab**	**39.8**	**15'**	**15'**	**F**	**8**		**-**	**2'**	**T**	**In Perkins Park u.s.end. Note - Island (need samples low terrace of river).**
22	**11**	**Lab**	**39.7**	**20'**	**30'**	**F**	**7**		**-**	**1-2'**	**T***	**Located in Perkins Park behind Stone Bldg.**
23	**12**	**Lab**	**38.6**	**50'**	**60'**	**F**	**6**	**LB**	**-**	**1.5'**	**T**	**Approx. 1000' d.s. of RR bridge. May move up to 1000' d.s.-best low terrace.**
24	**14**	**Lab**	**38**	**50'**	**100'**	**F**	**5**	**RB**	**-**	**3.5'**	**A, TCLP**	**Diagonal Across River, d.s. Main St Bridge and islands, at bend in river.**
25	14	Obs	37.4			P	5				**T***	Field Locate. Best low terrace, approx. 1500 ft upstream of WCI Dam.
26	**13**	**Lab**	**36.9**			**P**	**5**				**T**	**Field Locate. Best low terrace u.s. of WCI dam.**
Warren - Main Street Substation Dam (WCI) - River Mile 36.79												
27	15	Obs	36.6	100'	60'	F	9		-		**T**	Located 150' d.s. small tributiary on RB.
28	**15**	**Lab**	**36.2**	**30'**	**80'**	**F**	**9**		**-**	**8-10'**	**T**	**Across outfall at slag pile, u.s. Warren WWTP outfall**
29	18	Obs	35.5	150'	50'	P	8		-	7'	**T***	DS Warren WWTP outfall
30	19	Obs	35.1	60'	40'	P	8		-		**T***	
31	**16**	**Lab**	**34.8**	**60'**	**200'**	**P**	**8**		**-**		**T**	
32	**17**	**Lab**	**34.3**	**Steep bank**	**200'**	**P**	**8**		**-**		**R, A, TCLP**	**d.s. RMI lagoon outfall.**
33	21	Obs	33.6	30'	60'	P	8		-		**T**	Approx. 1000 ft u.s. RR bridge
34	**18**	**Lab**	**33.2**	**40'**	**30'**	**P**	**8**		**-**		**R, T**	**Approx. 400' d.s. RR bridge.**
35	22	Obs	32.7	Steep	100'	P	8		-		**B, T***	at slag pile
36	**19**	**Lab**	**32.3**	**Steep RR**	**80'**	**P**	**8**		**-**		**T***	
37	23	Obs	32	60'	40'	P	8		-		**T***	Approx. 200' u.s. of tributary.
38	**20**	**Lab**	**31.5**	**20'**	**50'**	**P**	**8**		**-**		**T**	**Upstream Mosquito Creek. Approx. 300' u.s. Main St. bridge.**
39	24	Obs	31.2	20' RR	50'	P	8		-		**T***	Approx. 700 ft d.s. Mosquito Cr.
40	25	Obs	30.7	30'	60'	P	8		-		**T**	Approx. 200' u.s. of bridge, Blemont Ave.
41	**21**	**Lab**	**30.2**	**50'**	**40'**	**P**	**7**		**-**	**7'**	**T***	**Upstream end of powerplant.**

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TCLP=Toxic Characteristic Leaching Procedure

Table B-1 - Sampling and Analysis Plan Summary

Transect No.	Original Transect No.		River Mile (r.m.)	OHW Offset from Shore Left	OHW Offset from Shore Right	Estimated Free flowing (F) or Pooled (P)	OHW Above Pool	Refusal Depth @ Shore Line			*Analyses groups scheduled	Notes and Observations
42	27	Obs	29.8	30'	50'	P	6		-	6'	T*	Approx. 150' u.s. of bridge.
43	28	Obs.	29	Small bench below RR.	40'	P	6		-	6'	T*	Move approx 200' to area u.s. Mc Donald Steel Outfall
44	**22**	**Lab**	**28.7**	**40'**	**Short distance base slag dump**	**P**	**6**	**LB**	**-**	**4'**	**T**	**Downstream of McDonald Steel outfall. RB adjust to 100' d.s.**
45	New	Obs.	28.6			P	5				T*	Locate to best low terrace - not marked on recon trip.
46	New	Obs.	28.3			P	5				T*	Locate to best low terrace - not marked on recon trip.
47	29	Obs.	27.9	25'	< 20' slug	P	4		-		B, T*	Located 200' u.s. of Squaw Run (left bank trib)
48	New	Obs.	27.6			P	4				T*	Locate to best low terrace - not marked on recon trip.
49	30	Obs.	27.4	<15'	50'	P	4		-		T*	Located approx. 2000' upstream of # 23 Labical (#53). Use probe to locate r.b borings
50	New	Obs.	27.2			P	3				T*	Locate to best low terrace - not marked on recon trip.
51	***23***	***Lab***	***27.02***	***20'***	***20'***	***P***	***3***	***RB***	***-***	***>10'***	***T***	***Approx. 50 ft us. Girard Dam***
Girard - Liberty Street Dam - River Mile 26.97												
52	**24**	**Lab**	**26.95**	**60' - Approx. 150' d.s. of bridge.**	**20' - Approx. 20' d.s. of bridge.**	**P**	**9**	**RB**	**-**	**4'**	**T**	**Cut Section diagonal , approx 200 ft ds. Dam**
53	**25**	**Lab**	**26.5**	**30'**	**100'**	**P**	**8**	**LB**	**-**	**6'**	**B,T**	**u.s. slag dump**
54	**26**	**Lab**	**26.1**	**200'**	**20'**	**P**	**8**	**LB**	**-**	**6'**	**B,T**	**At slag dump, u.s. Fourmile Run & little Squaw Creek**
55	3	Obs	25.9	100' - Approx. 150' u.s. of RR Bridge.	30' - Approx. 250' u.s. of RR Bridge.	P	7	LB	-	8'	B, T*	u.s of RR bridge - d.s. of slag dump
56	**27**	**Lab**	**24.9**			**P**	**7**				**T**	**Field Locate. Best low terrace.**
57	**28**	**Lab**	**24.2**			**P**	**6**				**B, A, TCLP**	**Field Locate. Best low terrace, near Rt. 711 Bridge**
58	31	Obs	23.2	15'	30'	P	6		-	3'	T*	Approx. 200' u.s. of dam.
Youngstown - Crescent Street Dam - River Mile 23.14												
59	32	Obs	**22.8**			F	9				T*	Field Locate. Best low terrace d.s. of dam.
60	**29**	**Lab**	**22.3**	**100'**	**Steep 10'**	**P**	**9**	**RB**	**-**	**1'**	**T**	**Approx. 150-250' u.s. of sewer & u.s. Miller Cr.**

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Transect No.	Original Transect No.		River Mile (r.m.)	OHW Offset from Shore		Estimated Free flowing (F) or Pooled (P)	OHW Above Pool	Refusal Depth @ Shore Line			*Analyses groups scheduled	Notes and Observations
				Left	Right							
61	30	Lab	21.8	20' - Approx. 80-100' d.s. of RR bridge.	20' - Approx. 20' u.s. of RR bridge.	P	8		-		T	Cut diagonal transect, d.s. Mill Cr. at island.
62	31	Lab	21.4	100'	15'	P	7		-		B, A, TCLP	Located 50' d.s. of B & O Station dock. Right bank Brownfield issues
Youngstown - Mahoning Avenue Street Dam - River Mile 21.11												
63	32	Lab	20.9	100'	10' V. steep	F	10		-		B, T, R	Located @ d.s. end of island, d.s. of dam.
64	33	Lab	20.6	25'	15' V. steep brownfield	F	10	LB	-	5.5'	B, A	Located 200' d.s. of Market St. Bridge.
65	34	Lab	19.9	25'	10' V. steep	F	9	LB	-	5.5'	T, R	
66	35	Lab	19.4	10'	150' - base RR berm	F	9	LB	-	4'	T*	Moveable u.s. if can better locate. Approx. 600' u.s. of RR bridge, d.s. Crab Creek & u.s. sewer.
67	36	Lab	19.3	60'	20'	F	9	LB	-	1'	T	Sample island approx. 400' d.s. of RR Bridge.
68	New	Obs	19.1			F	9		-		T*	Just d.s. of tribuitary on RB. Sample lagoon area along RB below sand and gravel business.
69	33	Obs	18.9	25'	30'	F	9	LB	-	2'	T	
70	*37*	*Lab*	*18.3*	*60' @ base of concrete wall*	*25' Steep*	*P*	*9*	*LB*	-	*2'*	*B, A, TCLP*	*Approx. 100' u.s. of Tribuitary on RB (Dry Run) .*
Haselton - Center Street Dam - River Mile 18.20												
71	38	Lab	18	200'	20' Very steep	P	11	LB	-	1'	B, T	Approx. 1500 ft d.s. of dam.
72	34	Obs	17.4			P	9				T*	Field Locate. Best low terrace.
73	39	Lab	16.8	High wall 10'	200'	P	6		-		B, A, TCLP	Approx. 100' d.s.of RR bridge.
74	40	Lab	16.3	High wall 15'	20'	P	9	LB	-	1'	T	move as needed to avoid slag sections in river 150' u.s. of dam.
Struthers - Bridge Street Dam - River Mile 16.28												

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TCLP=Toxic Characteristic Leaching Procedure

Table B-1 - Sampling and Analysis Plan Summary

Transect No.	Original Transect No.		River Mile (r.m.)	OHW Offset from Shore Left	OHW Offset from Shore Right	Estimated Free flowing (F) or Pooled (P)	OHW Above Pool	Refusal Depth @ Shore Line			*Analyses groups scheduled	Notes and Observations
75	**41**	**Lab**	**16.1**	**40' at base of high wall 1000' d.s. of dam.**	**30'**	**F**	**9**		**-**		**T**	**Approx 700 ft d.s. of dam.**
76	35	Obs	15.6	25'	25'	F	8		-		T*	End of Youngstown Tube Bldg in CASTLO on RB.
77	**42**	**Lab**	**15.1**	**15'**	**80'**	**P**	**8**	**RB**	**-**	**1'**	**A**	**Approx. 500' d.s. of tributary coming in from RB.**
78	37	Obs	14.6								T*	Field locate - best representative section
79	36	Obs	14.1	75'	30'	P	7	RB	-	7'	T*	Located under overhead powerline.
80	New	Obs	13.8			P	7				T*	
81	**43**	**Lab**	**13.5**	**70'**	**10' V. Steep**	**P**	**6**	**RB**	**-**	**2'**	**T**	**Nice mudd bench, u.s. Grays Run.**
82	**44**	**Lab**	**13.2**	**150' Very nice bench**	**10' Very steep**	**P**	**5**	**LB**	**-**	**> 8'**	**A, TCLP**	**To base sandstone outcrop, approx. 700 ft u.s. dam**
Lowellville - 1st Street Dam - River Mile 13.05												
83	**45**	**Lab**	**12.9**	**25'**	**70'**	**F**	**8**	**LB**	**-**	**< 1'**	**T**	**Approx. 600' d.s. of dam.**
84	**46**	**Lab**	**12.6**	**10'**	**10'**	**F**	**8**	**LB**	**-**	**1'**	**T***	**Approx. 30' u.s. of sewer outfall. Cross d.s end of island install extra bank borings in island.**
85	**47**	**Lab**	**12.3**	**150'**	**100'**	**F**	**8**	**LB**	**-**	**3'**	**A, TCLP**	**Upstream end of powerstation.**
86	6	Obs.	12	5'	20'	F	8		-	2'	T*	Approx. 20' u.s. of remnant dam.
87	38	Obs	11.85	35'	50'	F	8		-		T	Approx. 500' d.s. of old dam.

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Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
Upstream Extent of Investigation - Downstream end of Leavitt Street Dam Pool																	
1	**46.2**	**1 Lab**	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	**1**	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
Leavittsburg - Leavitt Street Dam - River Mile 46.18																	
2	**46.1**	**1 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
3	**45.8**	**2 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
4	**45.4**	**2 Lab**	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	**1**	**1**	**1**	**1**	**1**	**1**							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Composite: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
4	**45.4**	**2 Lab**	c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
Leavittsburg - Lovers Lane Dam - River Mile 45.30																	
5	**45.1**	**4 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
6	**44.6**	**5 Obs**	**c**	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	**1**												
7	**44.1**	**7 Obs**	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	**1**	**1**	**1**	**1**	**1**							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Composite: Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
7	44.1	7 Obs	f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	**1**	**1**	**1**	**1**	**1**	**1**							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
8	43.7	8 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
9	43.5	3 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	**1**												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
9	43.5	3 Lab	BK **										1	1	1	1	1

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
10	43.2	9 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
11	42.8	4 Lab	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
12	42.6	10 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
Warren - North River Road Dam - River Mile 42.55																	
13	42.5	11 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
14	42.2	5 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	**1**												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
14	42	5 Lab	i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
15	41.6	6 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	**1**												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
16	40.9	7 Lab	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	**1**	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	**1**	**1**	**1**	**1**	**1**							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
16	40.9	7 Lab		2	**1**	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
17	40.6	12 Obs	c	1	1												
				2	1												
				3	1												

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**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Chemical Analyses: Composite: Radioisotopes	Complete TCLP	Geotech Analyses: Composite: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
17	40.6	12 Obs	g	1	1												
				2	1												
				3	1												
18	40.4	8 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	**1**												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
19	40.1	9 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	**1**												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

					Chemical Analyses								Geotech Analyses				
Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
19	40.1	9 Lab	h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
Warren - Summit Street Dam - River Mile 40.05																	
20	39.9	13 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
21	39.8	10 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	**1**												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	**1**												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
22	39.7	11 Lab	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Composite: Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
23	38.6	12 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	**1**												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
23	38.6	12 Lab continued	IN*										1	1	1	1	1
			BK **										1	1	1	1	1
24	38	14 Lab	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	**1**	**1**	**1**	**1**	**1**							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	**1**	**1**	**1**	**1**	**1**							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
25	37.4	14 Obs	c	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

					Chemical Analyses								Geotech Analyses				
Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
25	37.4	14 Obs	g	1	1												
				2	1												
				3	1												
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
26	36.9	13 Lab		3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	**1**												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
26	36.9	13 Lab		3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
Warren - Main Street Substation Dam (WCI) - River Mile 36.79																	
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	**1**												
			e	1	1												
				2	1												
27	36.6	15 Obs		3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	**1**												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
28	**36.2**	**15 Lab**		3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			c	1	1												
				2	1												
29	**35.5**	**18 Obs**		3	1												
			g	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: TRPH (Discrete)	PAH (Discrete)	PCBs (Discrete)	Herbicides (Discrete)	Pesticides (Discrete)	TAL Metals (Inc. Cr+6) (Discrete)	Radioisotopes (Composite)	Complete TCLP (Composite)	Geotech Analyses: Moisture Content (Composite)	Atterberg Limits (Composite)	Grain Size (Composite)	Specific Gravity (Composite)	Organic Content (Composite)
30	35.1	19 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
31	34.8	16 Lab	a	1	1												
				2	1												
				3	**1**												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	**1**												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
32	34.3	17 Lab	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1	1						
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1	2	1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1	**1**						
				3	1	1	1	1	1	1							
32	34.3	17 Lab	i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
33	33.6	21 Obs		3	1												
			f	1	1												
				2	**1**												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1						1						
				3	1												
			c	1	1												
				2	1												
34	33.2	18 Lab		3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1						2						
				3	1												

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**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
34	33.2	18 Lab continued	f	1	1												
				2	**1**												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1						1						
				3	**1**												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
35	32.7	22 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
36	32.3	19 Lab	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
37	32	23 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
38	31.52	20 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	**1**												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
38	**31.5**	**20 Lab**	h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
39	**31.2**	**24 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
40	**30.7**	**25 Obs**	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	**1**												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
41	**30.4**	**21 Lab**	c	1	**1**												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
42	**29.8**	**27 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
43	**29**	**28 Obs**	c	1	1												
				2	1												
				3	1												

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**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
43	29	28 Obs	g	1	1												
				2	1												
				3	1												
44	28.7	22 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	**1**												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
45	28.6	NEW Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	**1**												
				3	1												
46	28.3	NEW Obs	c	1	1												
				2	1												
				3	1												
46	28.3	New Obs	g	1	1												
				2	1												
				3	1												
47	27.9	29 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
48	27.6	NEW Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
49	**27.4**	**30 Obs**	c	1	**1**												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
50	**27.2**	NEW **Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
51	**27.02**	**23 Lab**	a	1	1												
				2	**1**												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	**1**												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
51	**27.02**	**23 Lab**		3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1

Girard - Liberty Street Dam - River Mile 26.97

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Composite: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
52	26.95	24 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	**1**												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	**1**												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	**1**												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
53	26.5	25 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	**1**												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
53	26.5	25 Lab	i	1	1												
				2	1												
				3	1												
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
54	**26.1**	**26 Lab**	b	1	1												
				2	**1**												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
55	**25.9**	**3 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			u		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
56	**24.9**	**27 Lab**	a	1	**1**												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
56	**24.9**	**27 Lab**		3	1												

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*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
57	24.2	28 Lab	a	1	**1**	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1		1					
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	**1**	**1**	**1**	**1**	**1**							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			U		**1**	**1**	**1**	**1**	**1**	**1**	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
58	23.2	31 Obs	c	1	1												
				2	1												
				3	1												
58	23.2	31 Obs	g	1	1												
				2	1												
				3	1												
Youngstown - Crescent Street Dam - River Mile 23.14																	
59	22.8	32 Obs	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

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**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Composite: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
60	22.3	29 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	**1**												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
61	21.8	30 Lab	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	**1**												
				3	1												
			f	1	1												
				2	1												
				3	1												
61	21.8	30 Lab	g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
			b	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**		1					
62	21.4	31 Lab		3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												
			b	1	1												
63	20.9	32 Lab		2	1						1						
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	**1**												
				3	1												
			e	1	1												
				2	1						2						
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
63	20.9	32 Lab		2	1												
				3	1												
			h	1	1												
				2	1						**1**						
				3	1												
			i	1	1												
				2	1												
				3	1												
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

ACTEC

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: Discrete: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Composite: Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
64	20.6	33 Lab	c	1	**1**	**1**	**1**	**1**	**1**	**1**							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	**1**	1	1	1	1	1							
				3	1	1	1	1	1	1							
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
65	19.9	34 Lab	a	1	1												
				2	1												
				3	1												
			b	1	**1**												
				2	1						1						
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1						2						
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1						1						
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

ACTED

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
66	**19.4**	**35 Lab**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
67	**19.3**	**36 Lab**	a	1	1												
				2	1												
				3	1												
			b	1	**1**												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	**1**												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	**1**												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
68	19.1	**NEW Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			a	1	1												
				2	1												
				3	**1**												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
				1	1												
69	**18.9**	**33 Obs**	e	2	1												
				3	1												
				1	1												
			f	2	1												
				3	1												
				1	1												
			g	2	1												
				3	1												
				1	1												
			h	2	1												
				3	1												
				1	1												
			i	2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
				1	1	1	1	1	1	1							
			a	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
70	**18.3**	**37 Lab**	b	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	**1**	**1**	**1**	**1**	**1**	**1**							
			c	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			d	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			e	2	1	1	1	1	1	1		1					
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			f	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			g	2	1	1	1	1	1	1							
70	**18.3**	**37 Lab**		3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			h	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
				1	1	1	1	1	1	1							
			i	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1

Haselton - Center Street Dam - River Mile 18.20

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation		Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
						Chemical Analyses								Geotech Analyses				
						Discrete						Composite						
71	**18**	**38**	**Lab**	a	1	1												
					2	1												
					3	1												
				b	1	1												
					2	1												
					3	1												
				c	1	1												
					2	1												
					3	1												
				d	1	1												
					2	1												
					3	1												
				e	1	1												
					2	1												
					3	1												
				f	1	1												
					2	1												
					3	**1**												
				g	1	1												
					2	1												
					3	1												
				h	1	1												
					2	1												
					3	1												
				i	1	1												
					2	1												
					3	1												
				U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
				IN*										1	1	1	1	1
				BK **										1	1	1	1	1
72	**17.4**	**34**	**Obs**	c	1	1												
					2	1												
					3	1												
72	**17.4**	**34**	**Obs**	g	1	1												
					2	1												
					3	1												
73	**16.8**	**39**	**Lab**	a	1	**1**	**1**	**1**	**1**	**1**	**1**							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				b	1	1	1	1	1	1	1							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				c	1	**1**	**1**	**1**	**1**	**1**	**1**							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				d	1	1	1	1	1	1	1							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				e	1	1	1	1	1	1	1		1					
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				f	1	1	1	1	1	1	1							
					2	**1**	1	1	1	1	1							
					3	1	1	1	1	1	1							
				g	1	1	1	1	1	1	1							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				h	1	1	1	1	1	1	1							
					2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
			i	2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			U		1	1	1	1	1	1	10th Upland Core Composite@ OHW Line						
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
74	**16.3**	**40 Lab**		2	1												
				3	1												
			e	1	1												
				2	1												
				3	1												
			f	1	1												
				2	**1**												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
74	**16.3**	**40 Lab**	i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
Struthers - Bridge Street Dam - River Mile 16.28																	
			a	1	1												
				2	**1**												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
75	**16.1**	**41 Lab**	e	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
76	**15.6**	**35 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
77	**15.1**	**42 Lab**	a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
77	**15.1**	**42 Lab**	g	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
78	14.6	**37 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

ACTEDS

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses								Geotech Analyses				
					TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
79	14.1	**36 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
80	13.8	**New Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
			a	1	**1**												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
81	**13.5**	**43 Lab**	c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	**1**												
				3	1												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
81	**13.5**	**43 Lab**	h	1	1												
				2	1												
				3	1												
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
			a	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			b	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			c	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			d	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	**1**	1	1	1	1	1							
			e	1	1	1	1	1	1	1							
				2	**1**	**1**	**1**	**1**	**1**	**1**		1					
				3	1	1	1	1	1	1							
82	**13.2**	**44 Lab**	f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation		Boring	Sample Number	Chemical Analyses: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
						Discrete						Composite						
					1	1	1	1	1	1	1							
				g	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							
				h	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							
				i	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
				IN*										1	1	1	1	1
				BK **										1	1	1	1	1
Lowellville - 1st Street Dam - River Mile 13.05																		
					1	1												
				a	2	1												
					3	1												
					1	1												
83	**12.9**	**45**	**Lab**	b	2	1												
					3	1												
					1	1												
				c	2	1												
					3	1												
					1	1												
				d	2	1												
					3	1												
					1	1												
				e	2	1												
					3	1												
					1	**1**												
				f	2	1												
					3	1												
					1	1												
83	**12.9**	**45**	**Lab**	g	2	1												
					3	1												
					1	1												
				h	2	1												
					3	1												
					1	1												
				i	2	1												
					3	1												
				IN*										1	1	1	1	1
				BK **										1	1	1	1	1
					1	1												
				c	2	1												
84	**12.6**	**46**	**Lab**		3	**1**												
					1	1												
				g	2	1												
					3	1												
					1	1	1	1	1	1	1							
				a	2	1	1	1	1	1	1							
85	**12.3**	**47**	**Lab**		3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							
				b	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							
				c	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							
				d	2	1	1	1	1	1	1							
					3	1	1	1	1	1	1							
					1	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	Chemical Analyses: TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Geotech Analyses: Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
85	**12.3**	**47 Lab**	e	2	**1**	**1**	**1**	**1**	**1**	**1**		1					
				3	1	1	1	1	1	1							
			f	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			g	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			h	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			i	1	1	1	1	1	1	1							
				2	1	1	1	1	1	1							
				3	1	1	1	1	1	1							
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
86	**12**	**6 Obs**	c	1	1												
				2	1												
				3	1												
			g	1	1												
				2	1												
				3	1												
87	**11.85**	**38 Obs**	a	1	1												
				2	1												
				3	1												
			b	1	1												
				2	1												
				3	1												
			c	1	1												
				2	1												
				3	1												
			d	1	1												
				2	1												
				3	1												
			e	1	1												
				2	1												
				3	**1**												
			f	1	1												
				2	1												
				3	1												
			g	1	1												
				2	**1**												
				3	1												
			h	1	1												
				2	1												
				3	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

ACTED

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
			i	1	1												
				2	1												
				3	1												
			IN*										1	1	1	1	1
			BK **										1	1	1	1	1
					1524	**393**	**393**	**393**	**393**	**393**	**16**	**12**	**94**	**94**	**94**	**94**	**94**
	Field Duplicates																
1	**Field Dup #**	**1**	c	2	1	1	1	1	1	1							
1	**Field Dup #**	**2**	h	1	1												
4	**Field Dup #**	**3**	b	1	1	1	1	1	1	1							
4	**Field Dup #**	**4**	f	3	1												
6	**Field Dup #**	**5**	g	3	1												
9	**Field Dup #**	**6**	h	2	1												
7	**Field Dup #**	**7**	a	3	1	1	1	1	1	1							
7	**Field Dup #**	**8**	g	1	1	1	1	1	1	1							
14	**Field Dup #**	**9**	e	3	1												
15	**Field Dup #**	**10**	c	2	1												
16	**Field Dup #**	**11**	b	2	1												
16	**Field Dup #**	**12**	c	3	1	1	1	1	1	1							
16	**Field Dup #**	**13**	i	2	1												
18	**Field Dup #**	**14**	e	1	1												
19	**Field Dup #**	**15**	e	3	1												
21	**Field Dup #**	**16**	e	2	1												
21	**Field Dup #**	**17**	g	3	1												
27	**Field Dup #**	**18**	d	3	1												
23	**Field Dup #**	**19**	c	1	1												
24	**Field Dup #**	**20**	c	3	1	1	1	1	1	1							
24	**Field Dup #**	**21**	i	3	1	1	1	1	1	1							
26	**Field Dup #**	**22**	e	2	1												
28	**Field Dup #**	**23**	b	3	1												
31	**Field Dup #**	**24**	a	3	1												
31	**Field Dup #**	**25**	f	2	1												
32	**Field Dup #**	**26**	d	2	1	1	1	1	1	1							
34	**Field Dup #**	**27**	f	2	1												
34	**Field Dup #**	**28**	h	3	1												
33	**Field Dup #**	**29**	f	2	1												
38	**Field Dup #**	**30**	d	1	1												
41	**Field Dup #**	**31**	c	1	1												
40	**Field Dup #**	**32**	g	2	1												

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

Table B-2
Chemical and Geotechnical Analysis Schedule

Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Chemical Analyses								Geotech Analyses				
					Discrete						Composite						
44	**Field Dup #**	**33**	d	1	1												
45	**Field Dup #**	**34**	g	2	1												
49	**Field Dup #**	**35**	c	1	1												
51	**Field Dup #**	**36**	a	2	1												
51	**Field Dup #**	**37**	c	1	1												
52	**Field Dup #**	**38**	d	1	1												
52	**Field Dup #**	**39**	f	3	1												
52	**Field Dup #**	**40**	h	2	1												
53	**Field Dup #**	**41**	e	2	1												
54	**Field Dup #**	**42**	b	2	1												
56	**Field Dup #**	**43**	a	1	1												
57	**Field Dup #**	**44**	a	1	1												
57	**Field Dup #**	**45**	d	3	1	1	1	1	1	1							
57	**Field Dup #**	**46**	u		1	1	1	1	1	1							
60	**Field Dup #**	**47**	g	3	1												
61	**Field Dup #**	**48**	e	2	1												
62	**Field Dup #**	**49**										1					
62	**Field Dup #**	**50**	a	2	1	1	1	1	1	1							
62	**Field Dup #**	**51**	e	2	1	1	1	1	1	1							
63	**Field Dup #**	**52**	g,h,i								1						
63	**Field Dup #**	**53**	d	2	1												
64	**Field Dup #**	**54**	c	1	1	1	1	1	1	1							
64	**Field Dup #**	**55**	i	2	1												
65	**Field Dup #**	**56**	b	1	1												
69	**Field Dup #**	**57**	a	3	1												
67	**Field Dup #**	**58**	b	1	1												
67	**Field Dup #**	**59**	e	3	1												
67	**Field Dup #**	**60**	i	3	1												
70	**Field Dup #**	**61**	c	1	1	1	1	1	1	1							
71	**Field Dup #**	**62**	f	3	1												
73	**Field Dup #**	**63**	a	1	1	1	1	1	1	1							
73	**Field Dup #**	**64**	c	1	1	1	1	1	1	1							
73	**Field Dup #**	**65**	f	2	1												
74	**Field Dup #**	**66**	f	2	1												
75	**Field Dup #**	**67**	a	2	1												
77	**Field Dup #**	**68**	b	2	1	1	1	1	1	1							

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

ACTEC

Table B-2
Chemical and Geotechnical Analysis Schedule

					Chemical Analyses								Geotech Analyses				
Transect Number	Location COE RM	Original Transect Designation	Boring	Sample Number	TRPH	PAH	PCBs	Herbicides	Pesticides	TAL Metals (Inc. Cr+6)	Radioisotopes	Complete TCLP	Moisture Content	Atterberg Limits	Grain Size	Specific Gravity	Organic Content
					Discrete						Composite						
77	**Field Dup #**	**69**	g	2	1	1	1	1	1	1							
81	**Field Dup #**	**70**	a	1	1												
81	**Field Dup #**	**71**	e	2	1												
82	**Field Dup #**	**72**	d	3	1												
82	**Field Dup #**	**73**	e	2	1	1	1	1	1	1							
83	**Field Dup #**	**74**	f	1	1												
87	**Field Dup #**	**75**	e	3	1												
87	**Field Dup #**	**76**	g	2	1												
85	**Field Dup #**	**77**	e	2	1	1	1	1	1	1							
84	**Field Dup #**	**78**	c	3	1												
Total QC Samples					**76**	**20**	**20**	**20**	**20**	**20**	**1**	**1**	**0**	**0**	**0**	**0**	**0**
Sub Total for Field and QC Samples					**1600**	**413**	**413**	**413**	**413**	**413**	**17**	**13**	**94**	**94**	**94**	**94**	**94**
Sample Identification																	
Rinse Blank #		**1**			1	1	1	1	1	1							
Rinse Blank #		**2**			1	1	1	1	1	1							
Rinse Blank #		**3**			1	1	1	1	1	1							
Rinse Blank #		**4**			1	1	1	1	1	1							
Rinse Blank #		**5**			1	1	1	1	1	1							
Rinse Blank #		**6**			1	1	1	1	1	1							
Rinse Blank #		**7**			1	1	1	1	1	1							
Rinse Blank #		**8**			1	1	1	1	1	1							
Rinse Blank #		**9**			1	1	1	1	1	1							
Rinse Blank #		**10**			1	1	1	1	1	1							
IDW #		**1**			1	1	1	1	1	1							
IDW #		**2**			1	1	1	1	1	1							
IDW #		**3**			1	1	1	1	1	1							
IDW #		**4**			1	1	1	1	1	1							
IDW #		**5**			1	1	1	1	1	1							
IDW #		**6**			1	1	1	1	1	1							
IDW #		**7**			1	1	1	1	1	1							
IDW #		**8**			1	1	1	1	1	1							
IDW #		**9**			1	1	1	1	1	1							
IDW #		**10**			1	1	1	1	1	1							
Total for Rinse Blanks and IDW					**20**	**20**	**20**	**20**	**20**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Grand Total for all field, QC, Rinse Blank, and IDW					**1620**	**433**	**433**	**433**	**433**	**433**	**17**	**13**	**94**	**94**	**94**	**94**	**94**

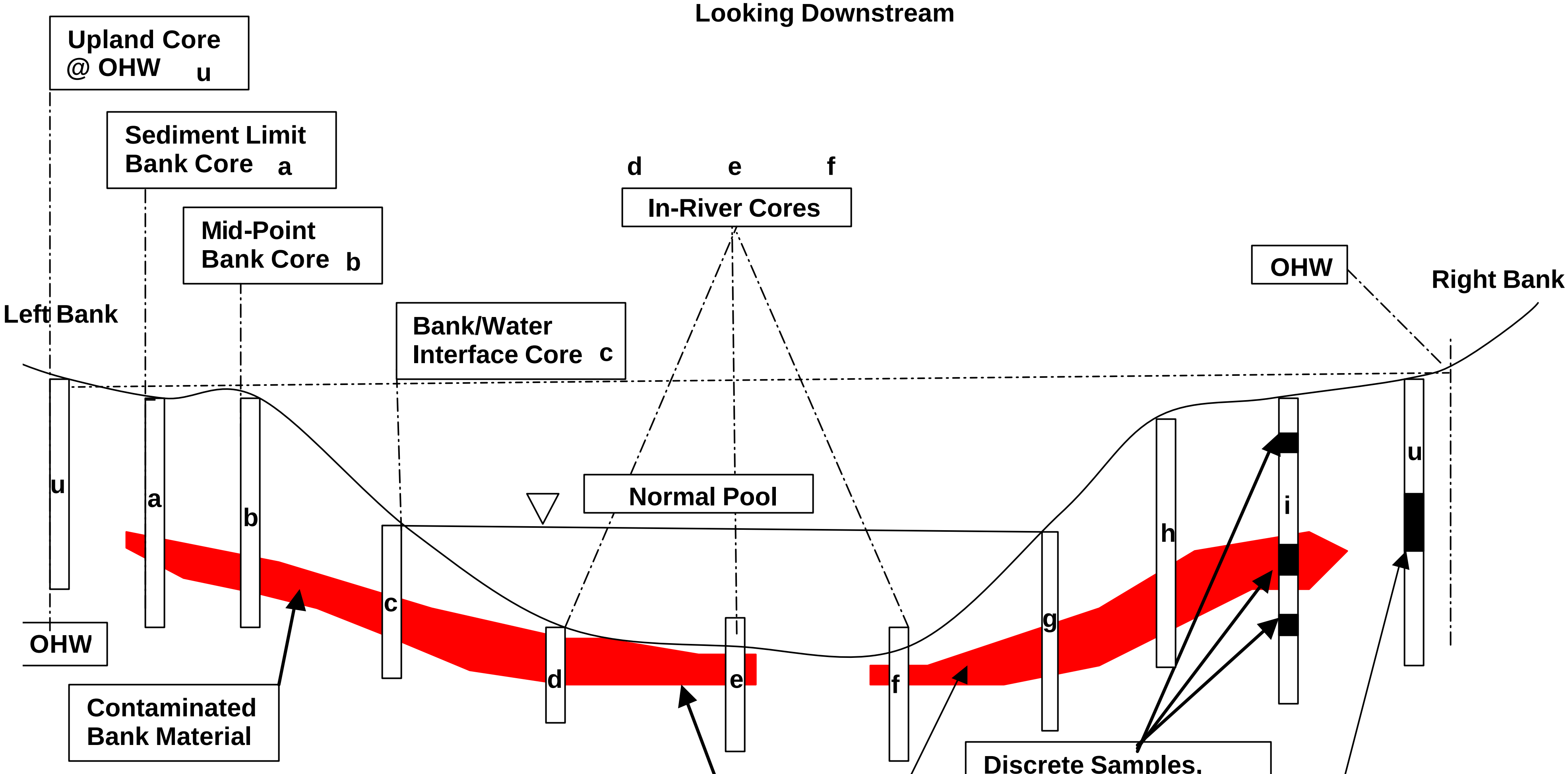
Note: Metals analyses for rinse Blanks and IDW do not include hexavalent chromium

Bold Outline and Font # = Location Field Duplicate Sample
*IN Composite sample collected from all in-river cores.
**BK Composite sample collected from all bank cores.

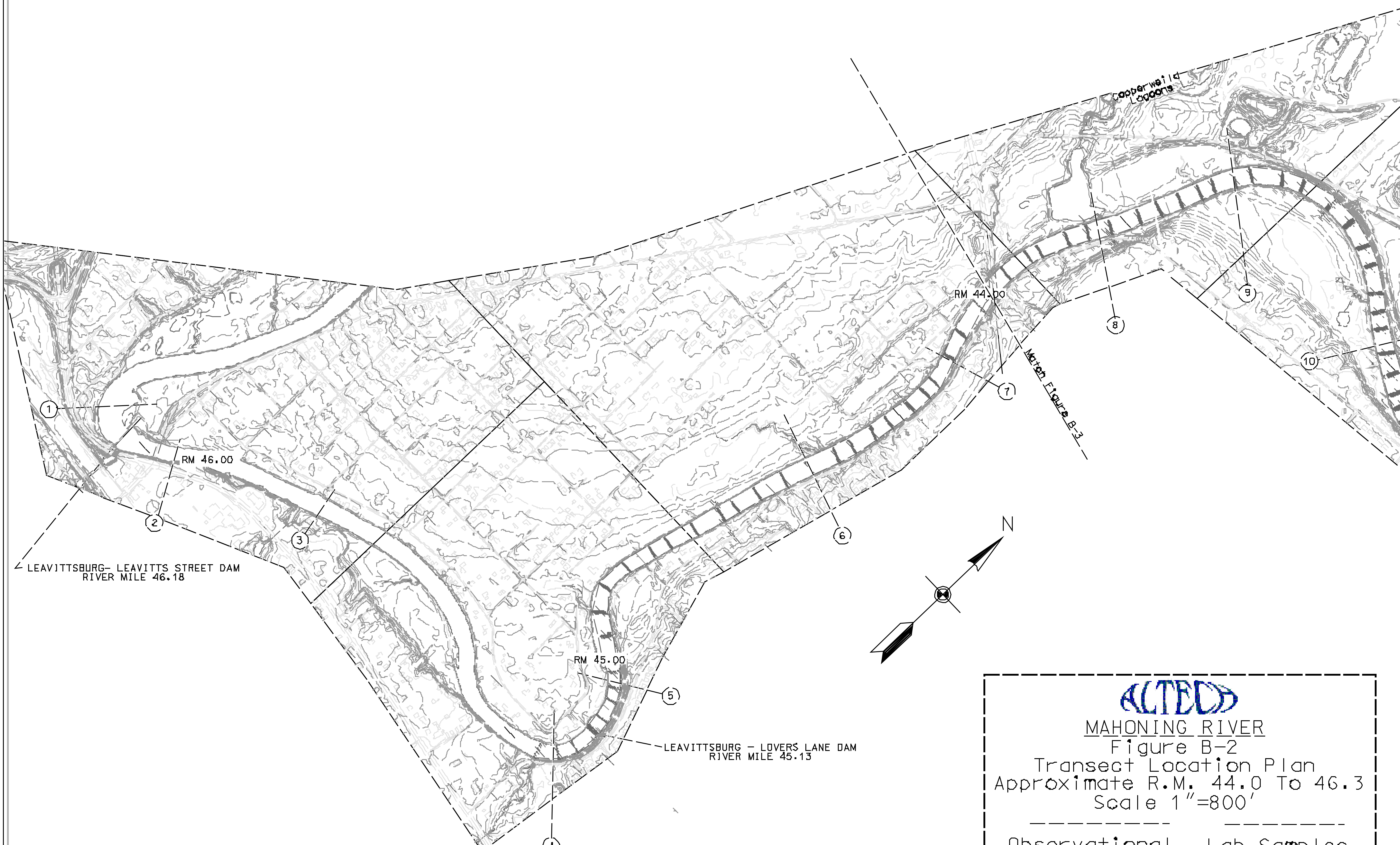
ACTEDS

FIGURES

TABLE B-1
TYPICAL TRANSECT
Looking Downstream



Notes:
1. Not all cores may be required at transect locations.
2. All 87 Transects shall be visually classified.
3. Discrete and Composite sampling required at 47 sampling and testing transects.
4. 40 distribution transects to be visually classified only, except cores c and g.



ALTECH

MAHONING RIVER

Figure B-2

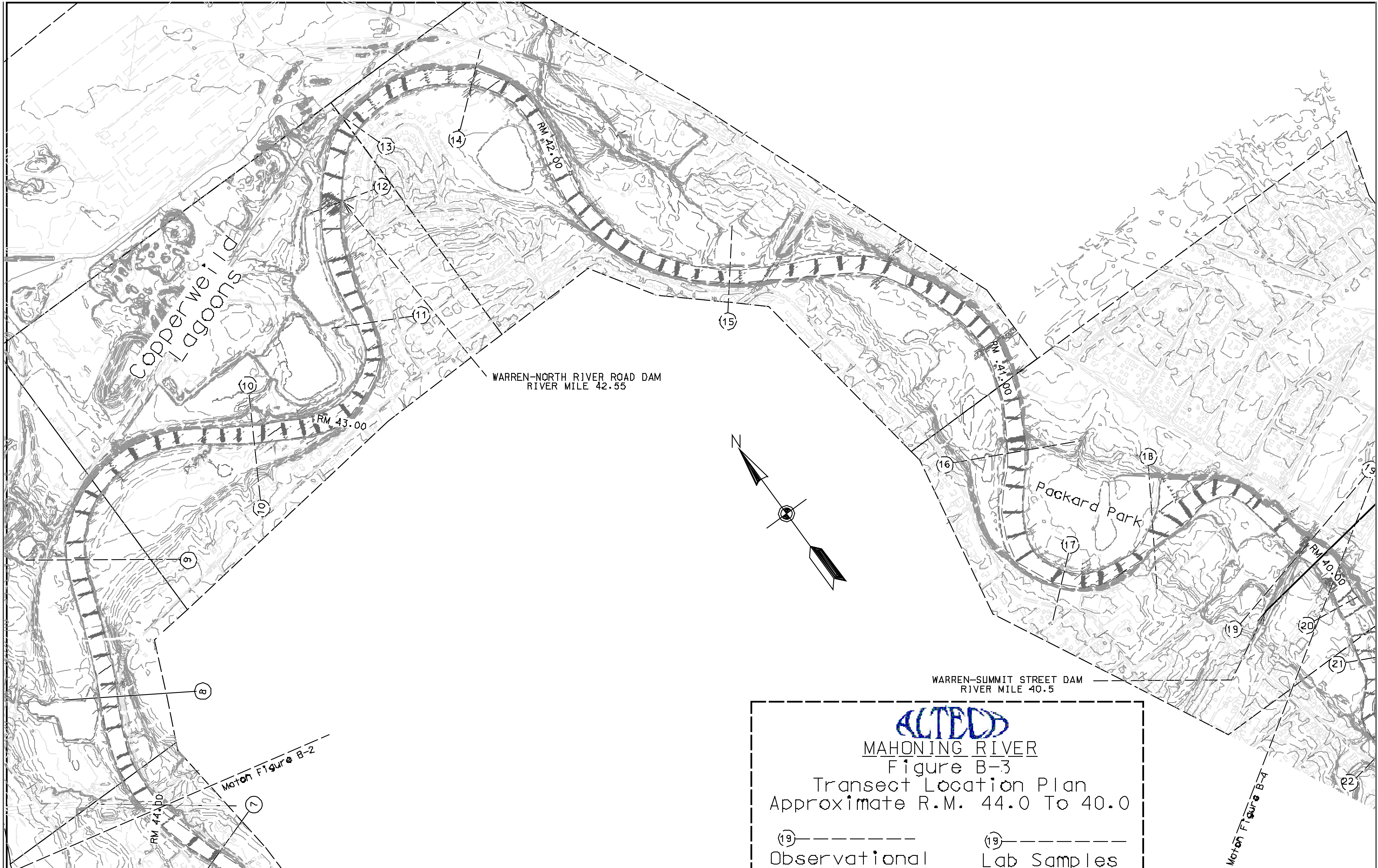
Transect Location Plan

Approximate R.M. 44.0 To 46.3

Scale 1"=800'

Observational

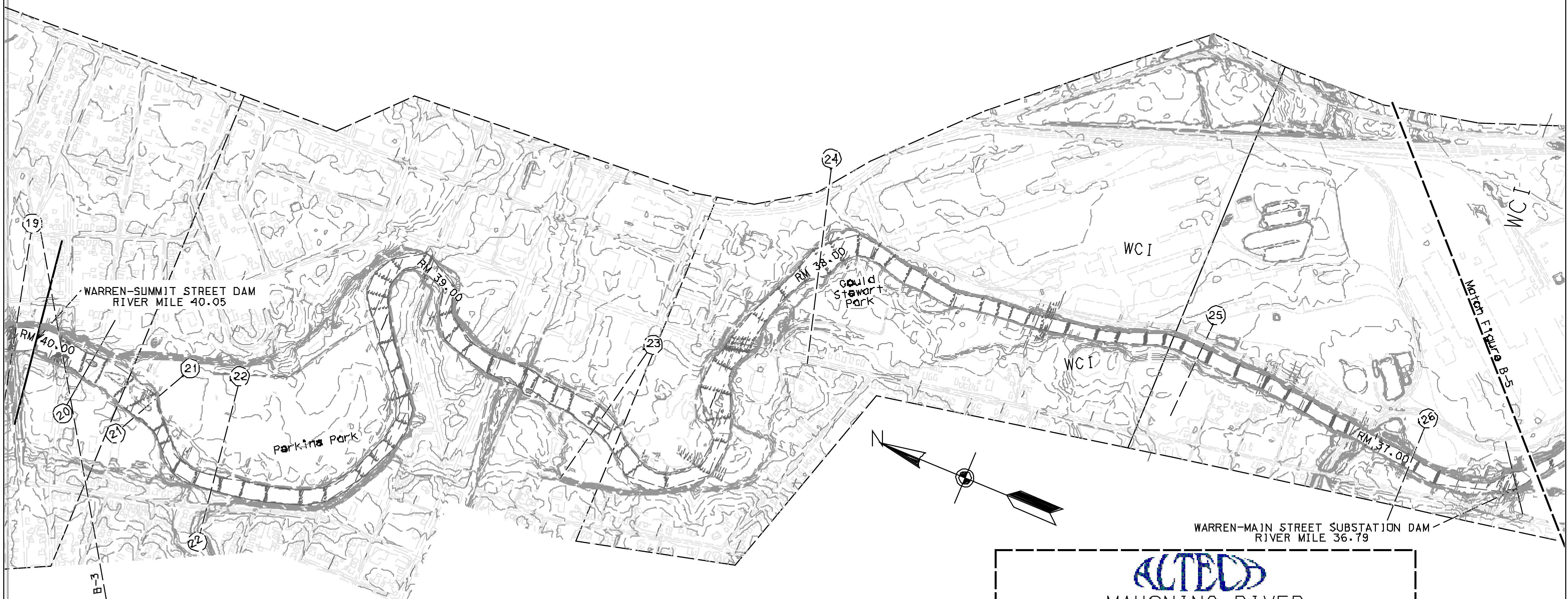
Lab Samples



ALTECH

MAHONING RIVER
Figure B-3
Transect Location Plan
Approximate R.M. 44.0 To 40.0

19 Observational
19 Lab Samples

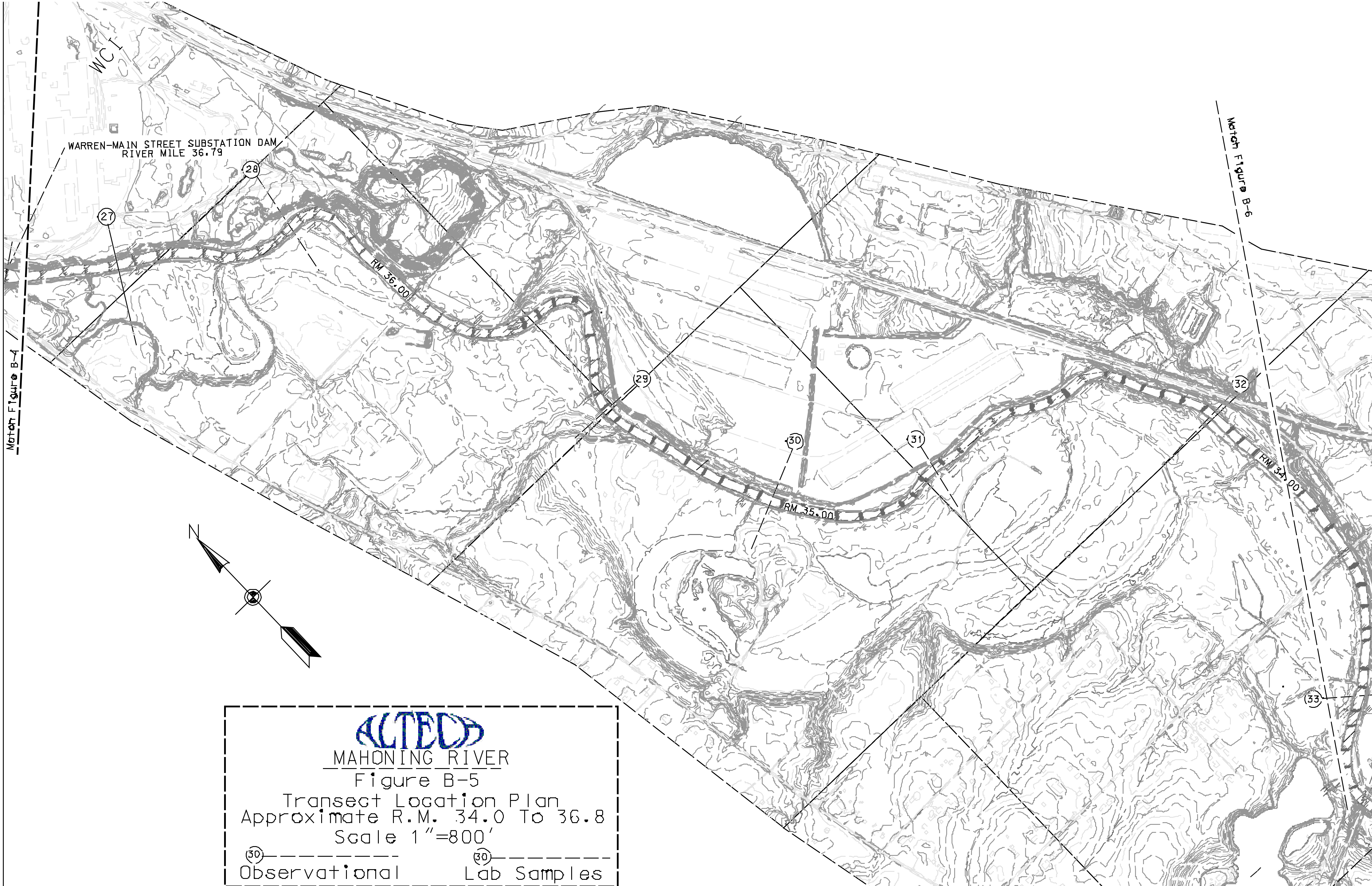


ALTECH

MAHONING RIVER
Figure B-4
Transect Location Plan
Approximate R.M. 36.8 To 40.0
Scale 1"=800'

(26) Observational

(26) Lab Samples



ALTECH

MAHONING RIVER

Figure B-5

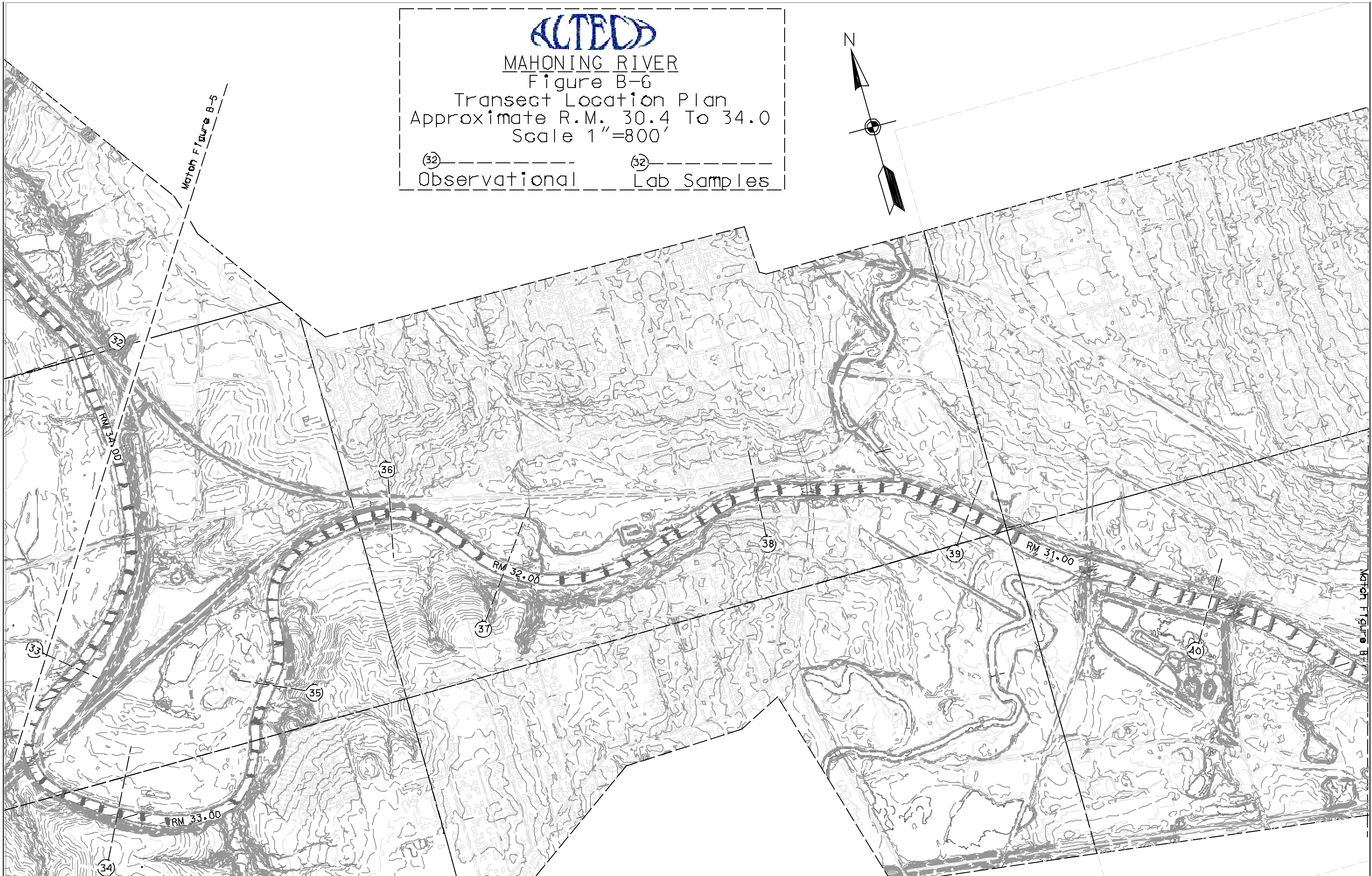
Transect Location Plan

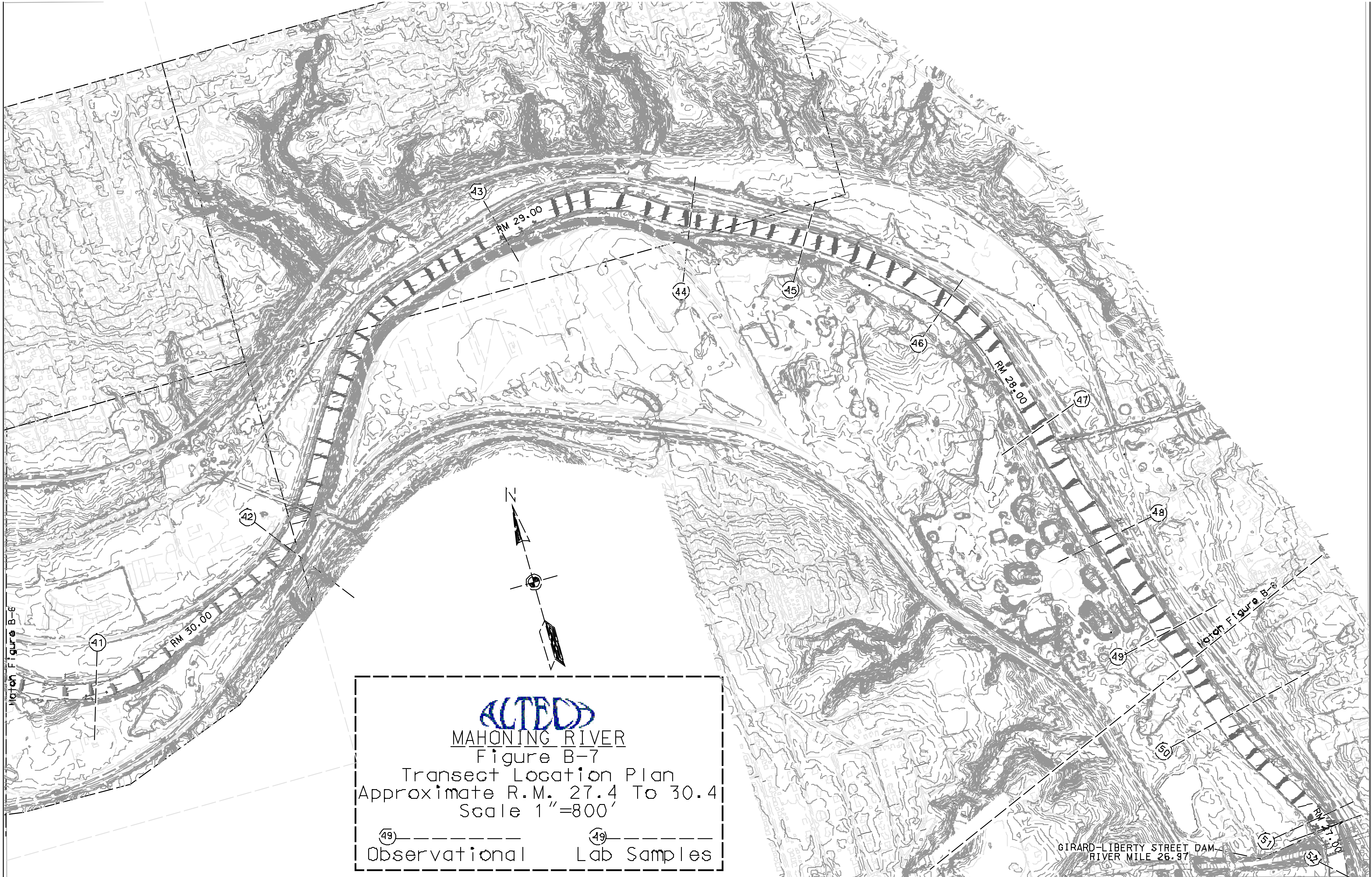
Approximate R.M. 34.0 To 36.8

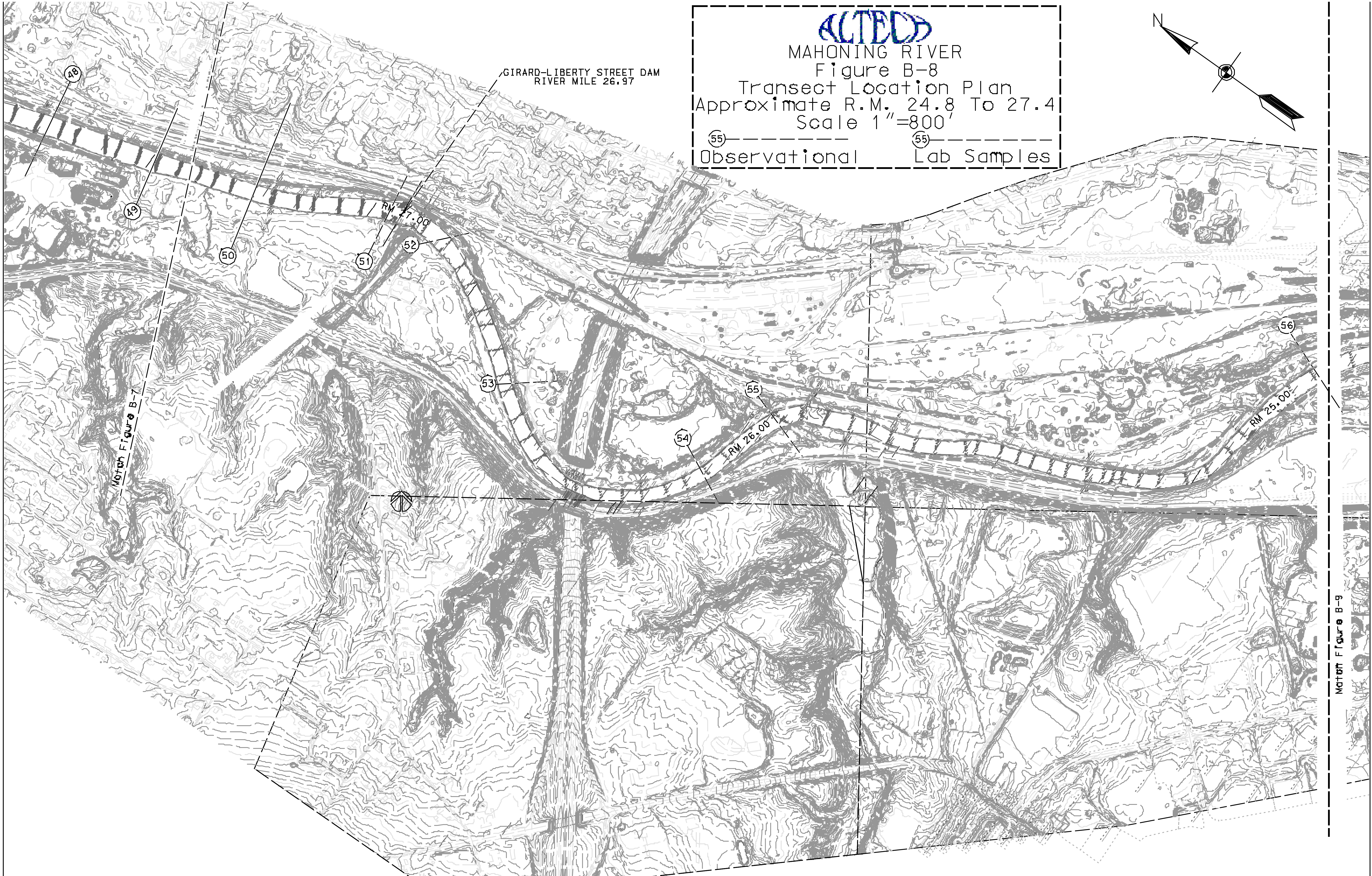
Scale 1"=800'

(30) Observational

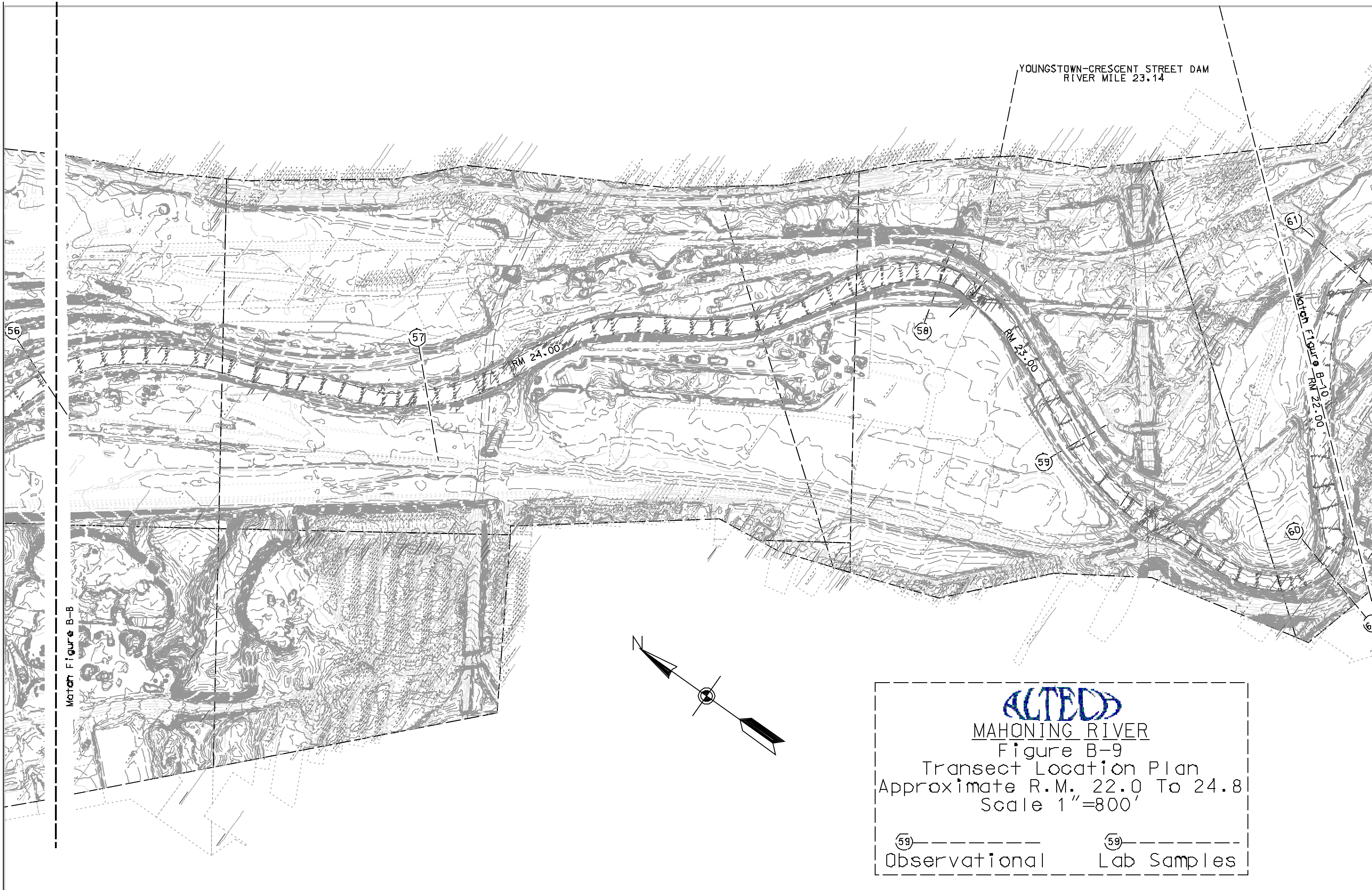
(30) Lab Samples


ALTECH
MAHONING RIVER
Figure B-6
Transect Location Plan
Approximate R.M. 30.4 To 34.0
Scale 1"=800'
32 Observational
32 Lab Samples
N
Match Figure B-5
Match Figure B-7
RM 34.00
RM 33.00
RM 32.00
RM 31.00
32
33
34
35
36
37
38
39
40


ALTECH
MAHONING RIVER
Figure B-7
Transect Location Plan
Approximate R.M. 27.4 To 30.4
Scale 1"=800'
49 Observational
49 Lab Samples
N
RM 30.00
RM 29.00
RM 28.00
RM 27.00
41
42
43
44
45
46
47
48
49
50
51
52
Match Figure B-6
Match Figure B-8
GIRARD-LIBERTY STREET DAM
RIVER MILE 26.97



ALTECH
MAHONING RIVER
Figure B-8
Transect Location Plan
Approximate R.M. 24.8 To 27.4
Scale 1"=800'
55 Observational
55 Lab Samples
N
GIRARD-LIBERTY STREET DAM
RIVER MILE 26.97
RM 27.00
RM 26.00
RM 25.00
48
49
50
51
52
53
54
55
56
Match Figure B-7
Match Figure B-9


YOUNGSTOWN-CRESCENT STREET DAM
RIVER MILE 23.14
56
57
58
59
60
61
RM 24.00
RM 23.00
RM 22.00
Match Figure B-8
Match Figure B-10
N
ALTECH
MAHONING RIVER
Figure B-9
Transect Location Plan
Approximate R.M. 22.0 To 24.8
Scale 1"=800'
59 Observational
59 Lab Samples

ALTECH

MAHONING RIVER

Figure B-10

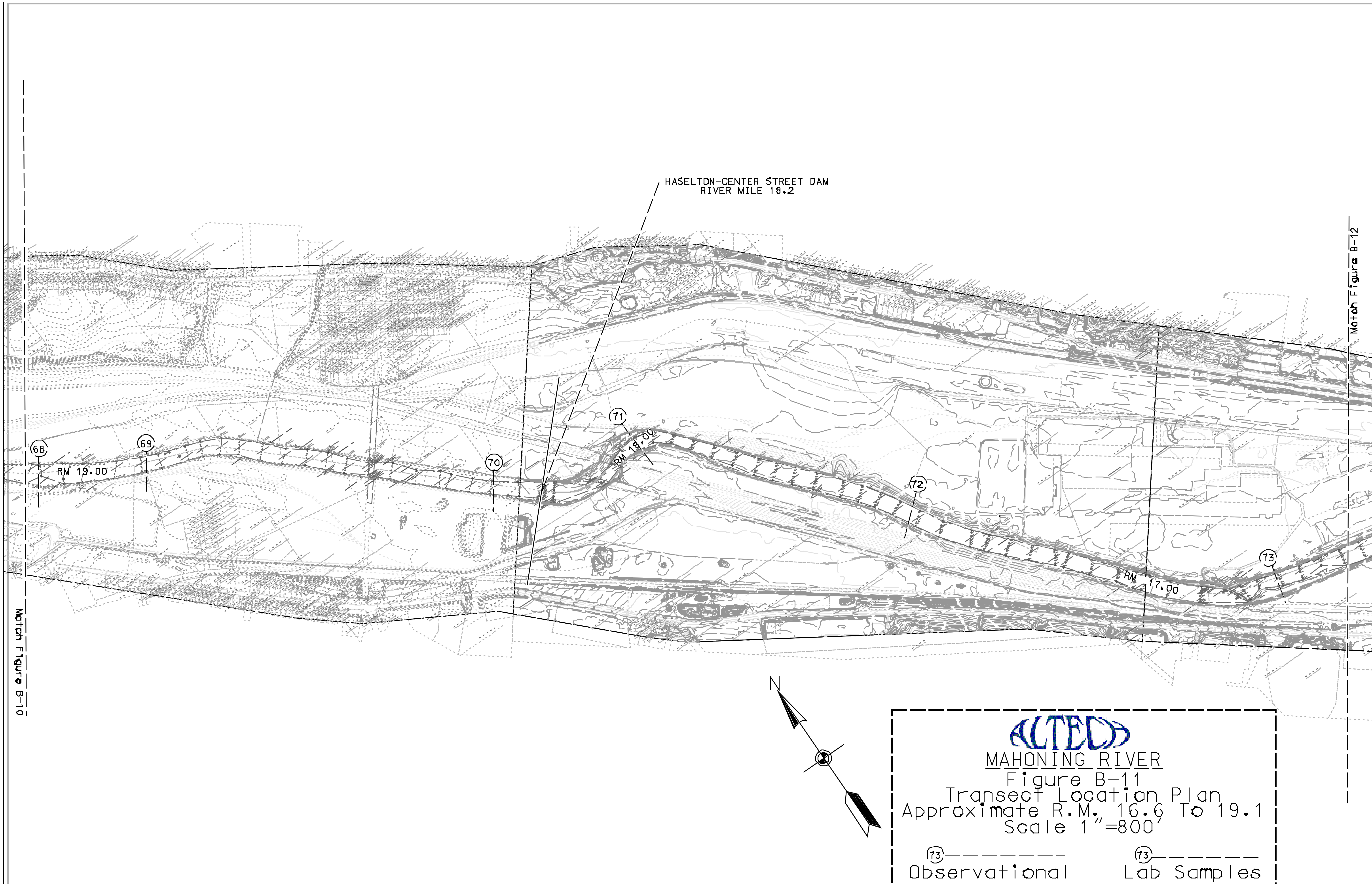
Transect Location Plan

Approximate R.M. 19.1 To 22.0

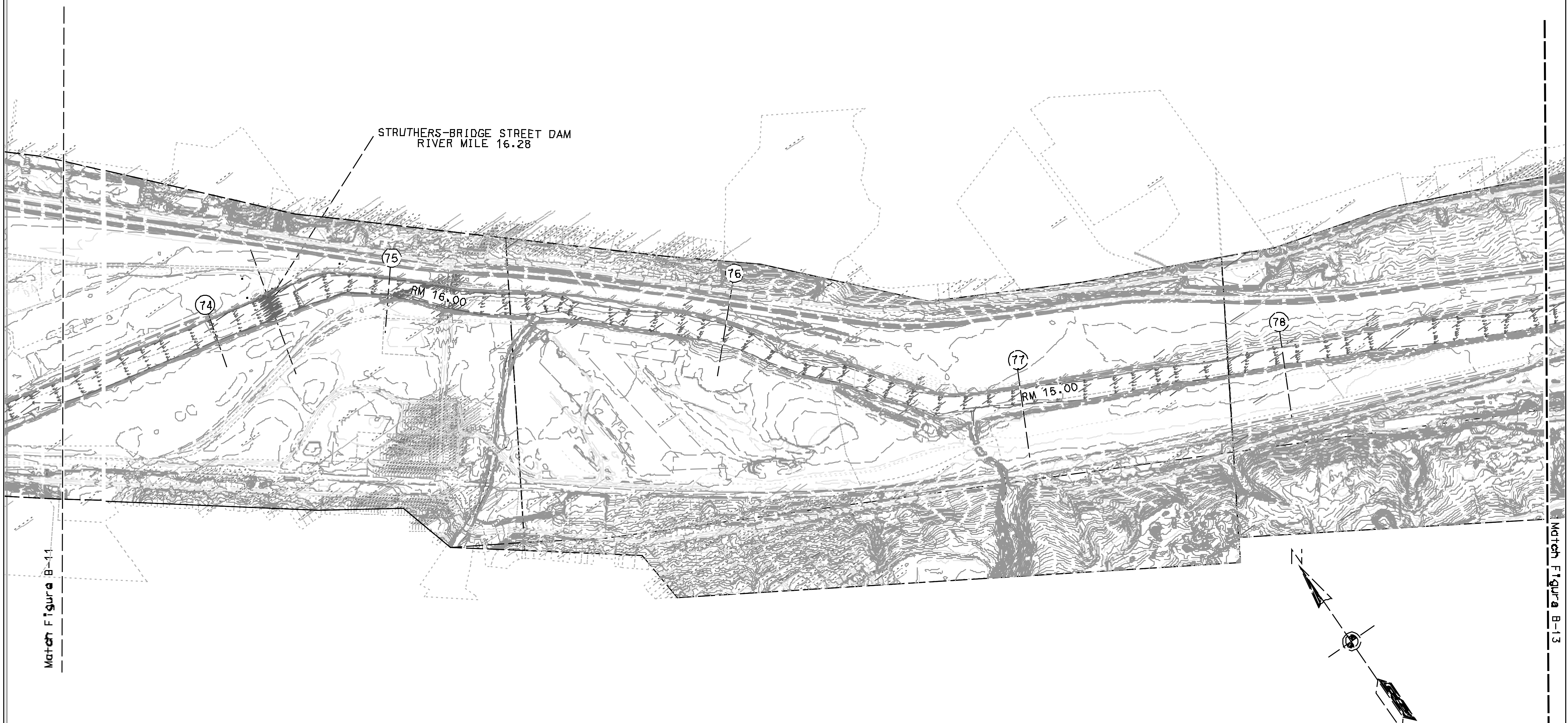
Scale 1"=800'

(67) Observational

(67) Lab Samples



HASELTON-CENTER STREET DAM
RIVER MILE 18.2
Match Figure B-12
Match Figure B-10
68
69
70
71
72
73
RM 19.00
RM 18.00
RM 17.00
N
ALTECH
MAHONING RIVER
Figure B-11
Transect Location Plan
Approximate R.M. 16.6 To 19.1
Scale 1"=800'
73 Observational
73 Lab Samples



ALTECH

MAHONING RIVER

Figure B-12

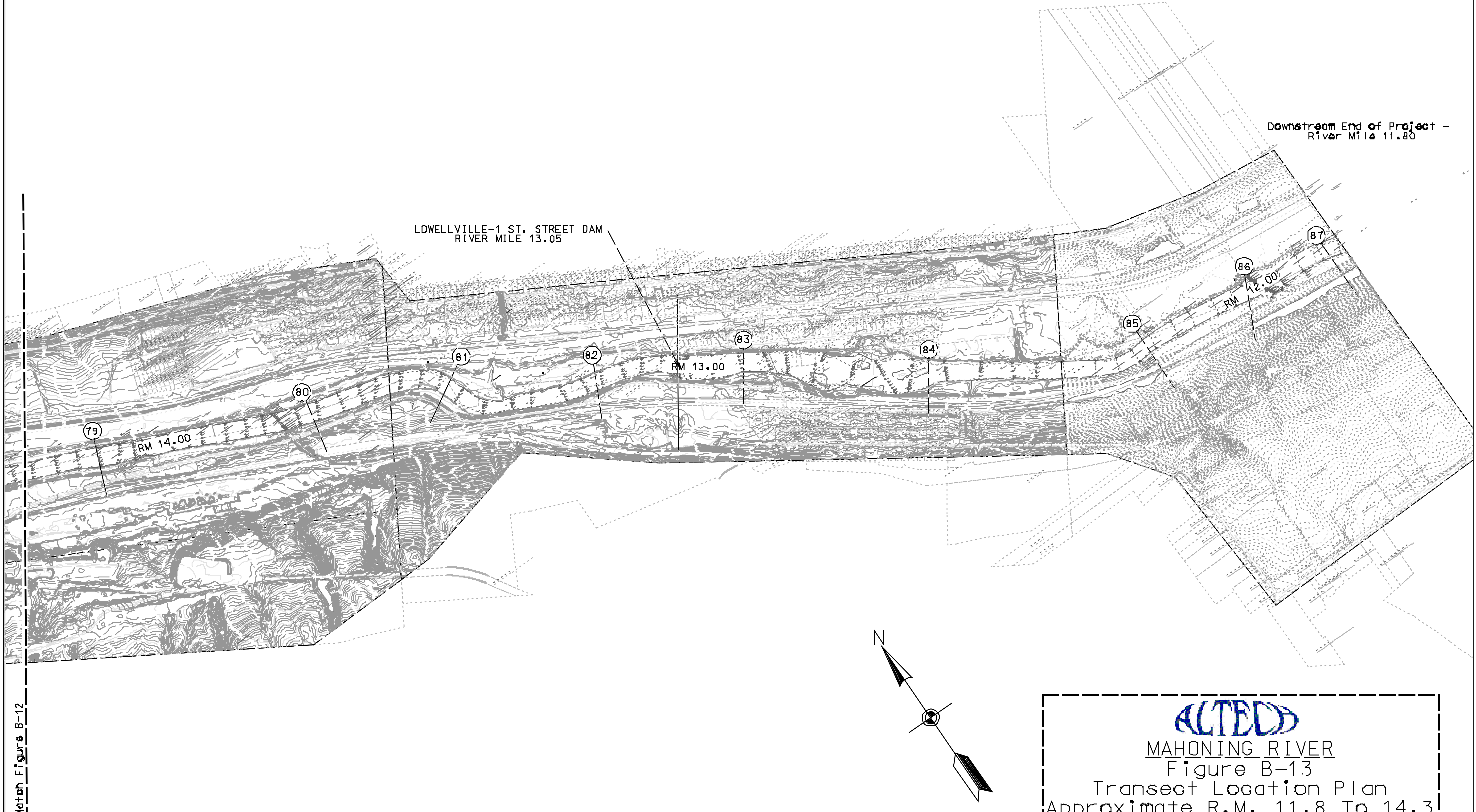
Transect Location Plan

Approximate R.M. 14.3 To 16.6

Scale 1"=800'

77 Observational

77 Lab Samples

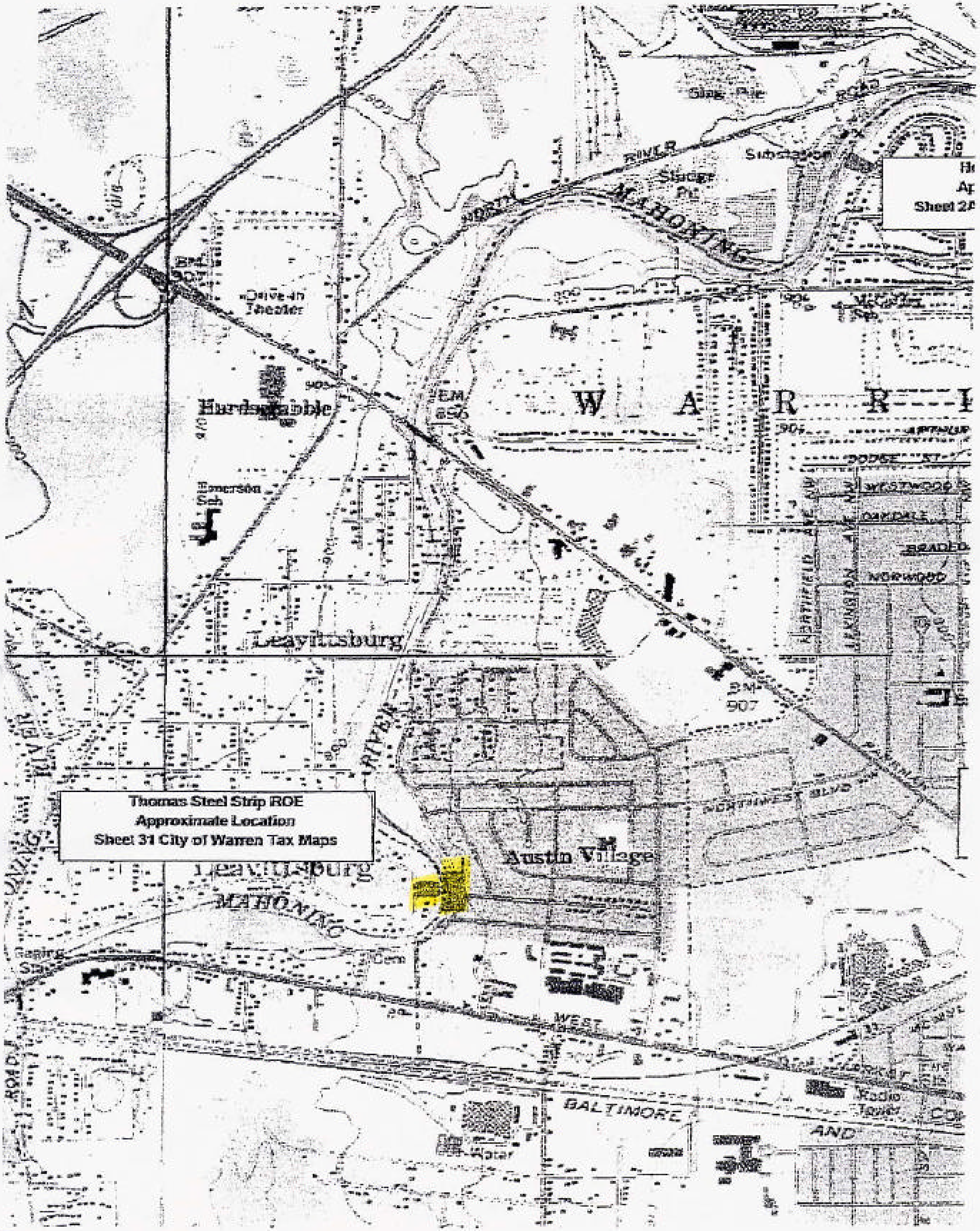


ALTECH

MAHONING RIVER
Figure B-13
Transect Location Plan
Approximate R.M. 11.8 To 14.3
Scale 1"=800'

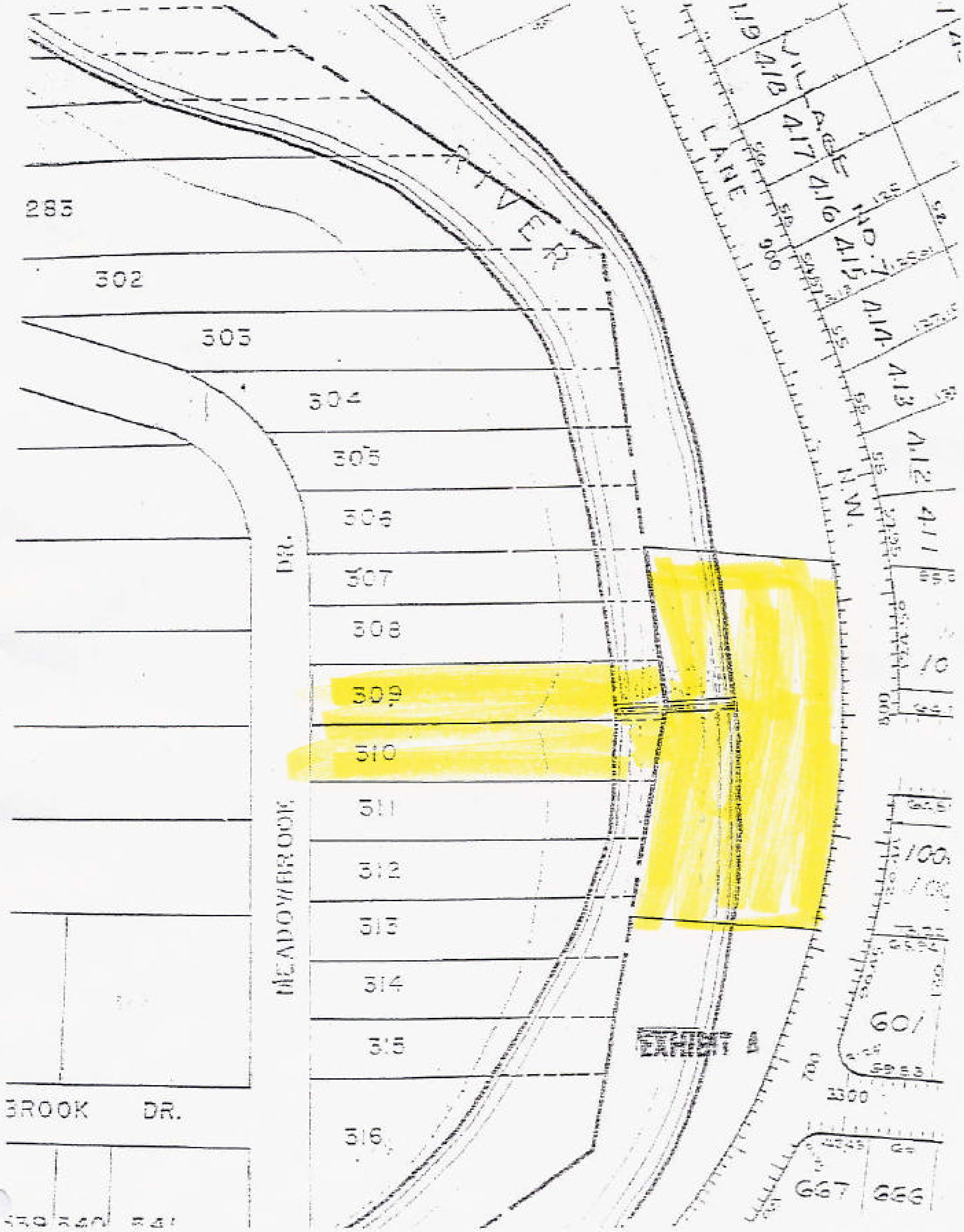
84 — Observational
84 — Lab Samples

Attachment
CELRP Rights of Entry

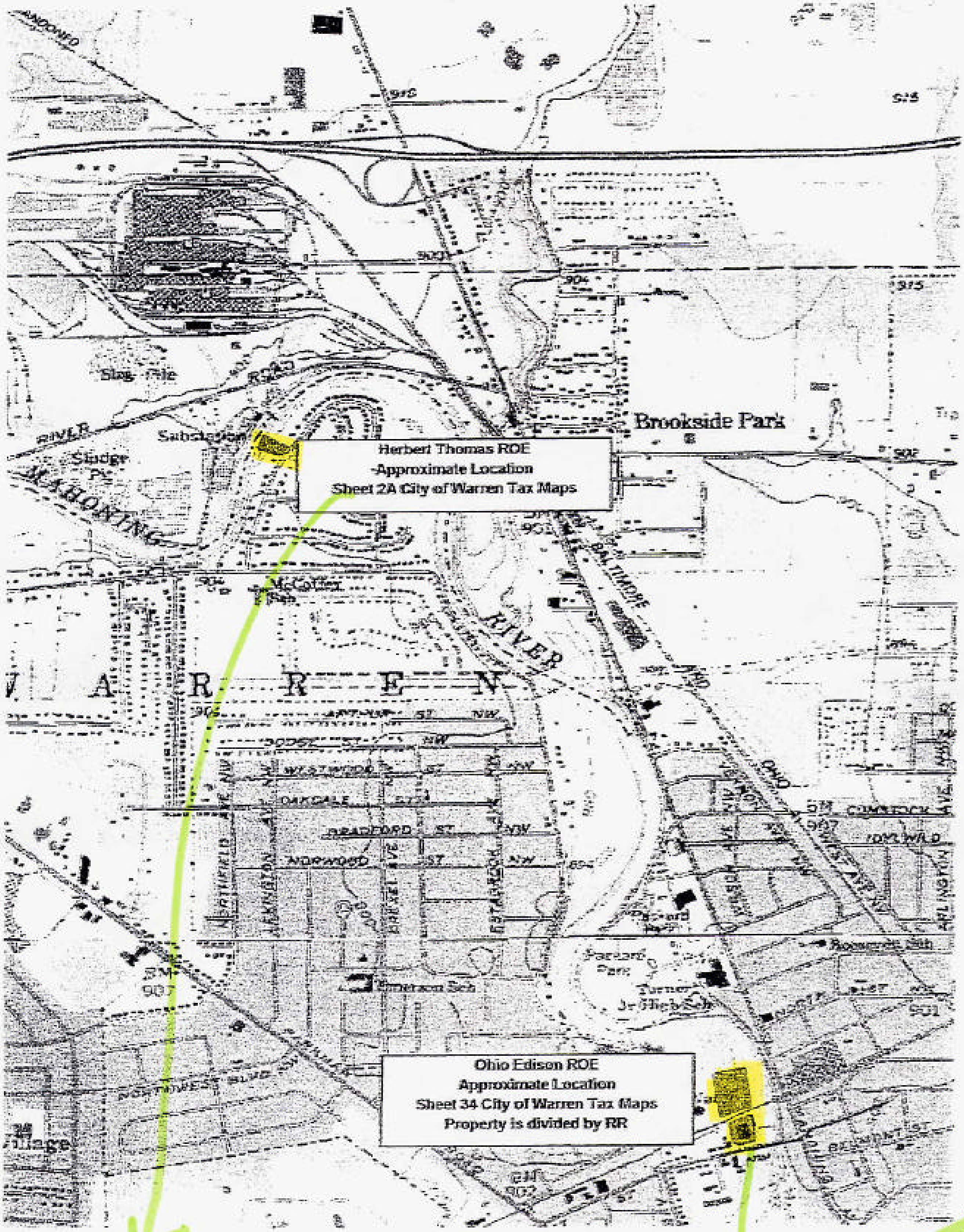


Sections
1/2

Near Leavittsburg [illegible] Dam

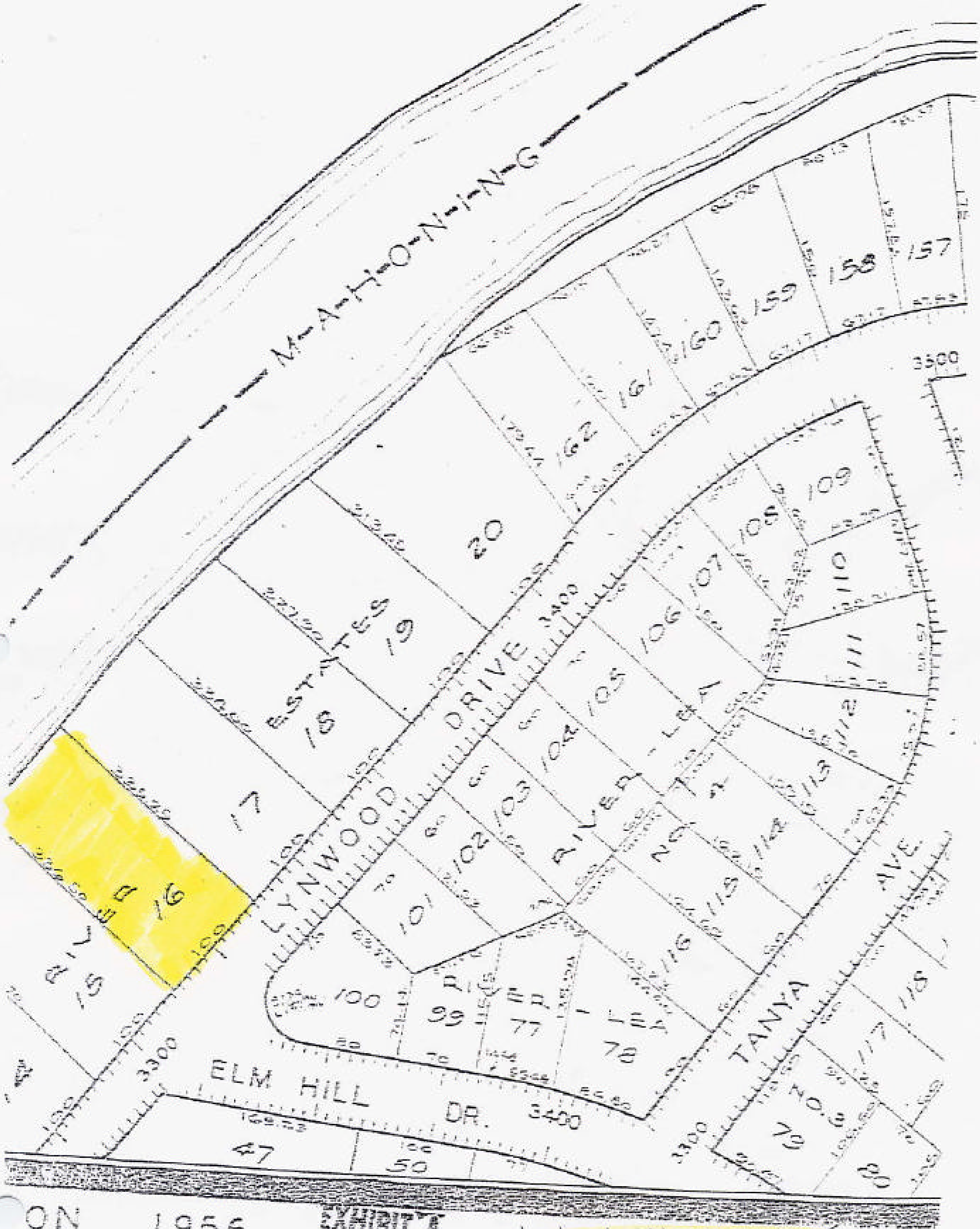


Thomas steel strip ROE near Leavittsburg Lovers dam
section 1&2



near Warren- North River Rd. dam
Section 2/3

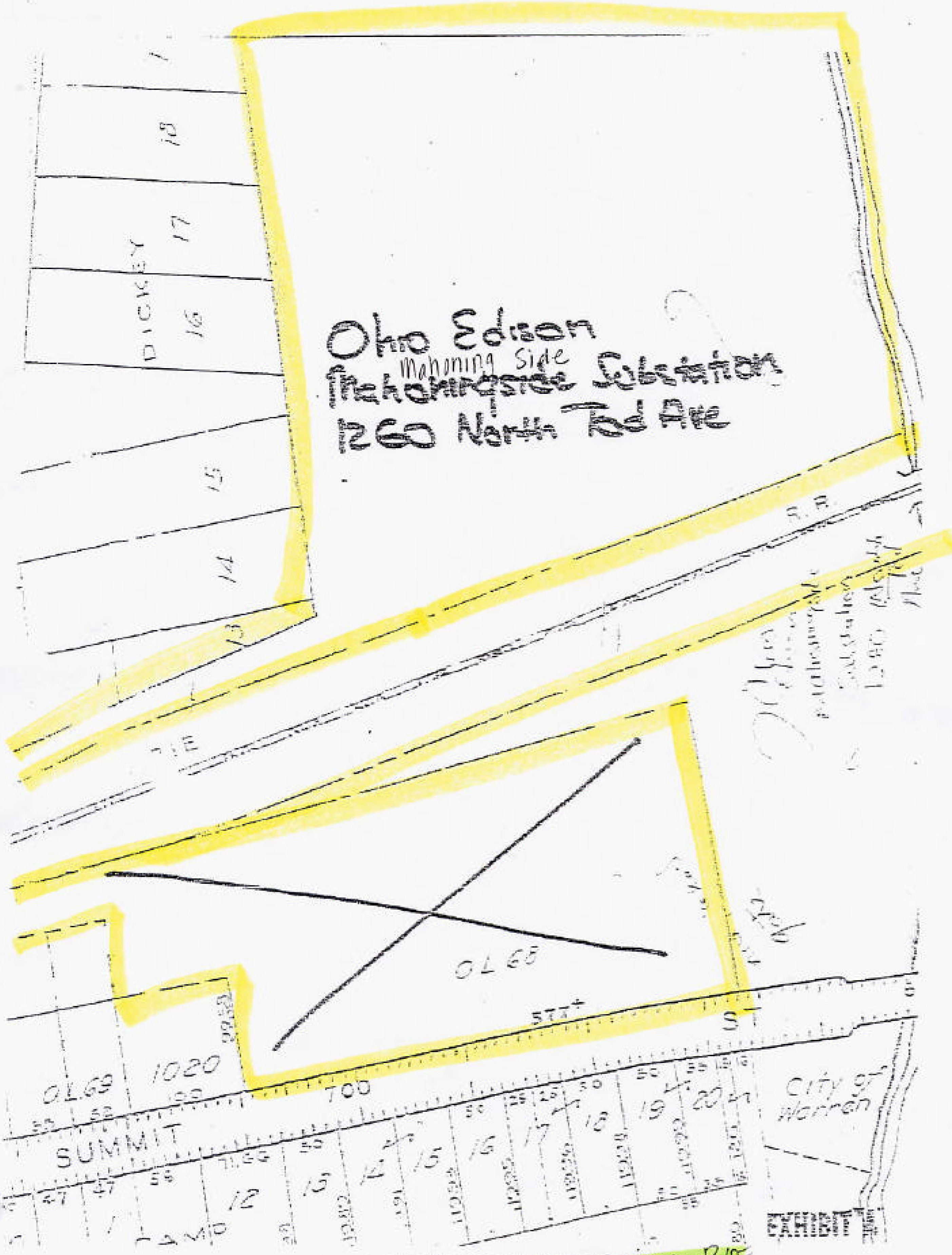
Near Warren- Summit St. dam
Sections 3/4



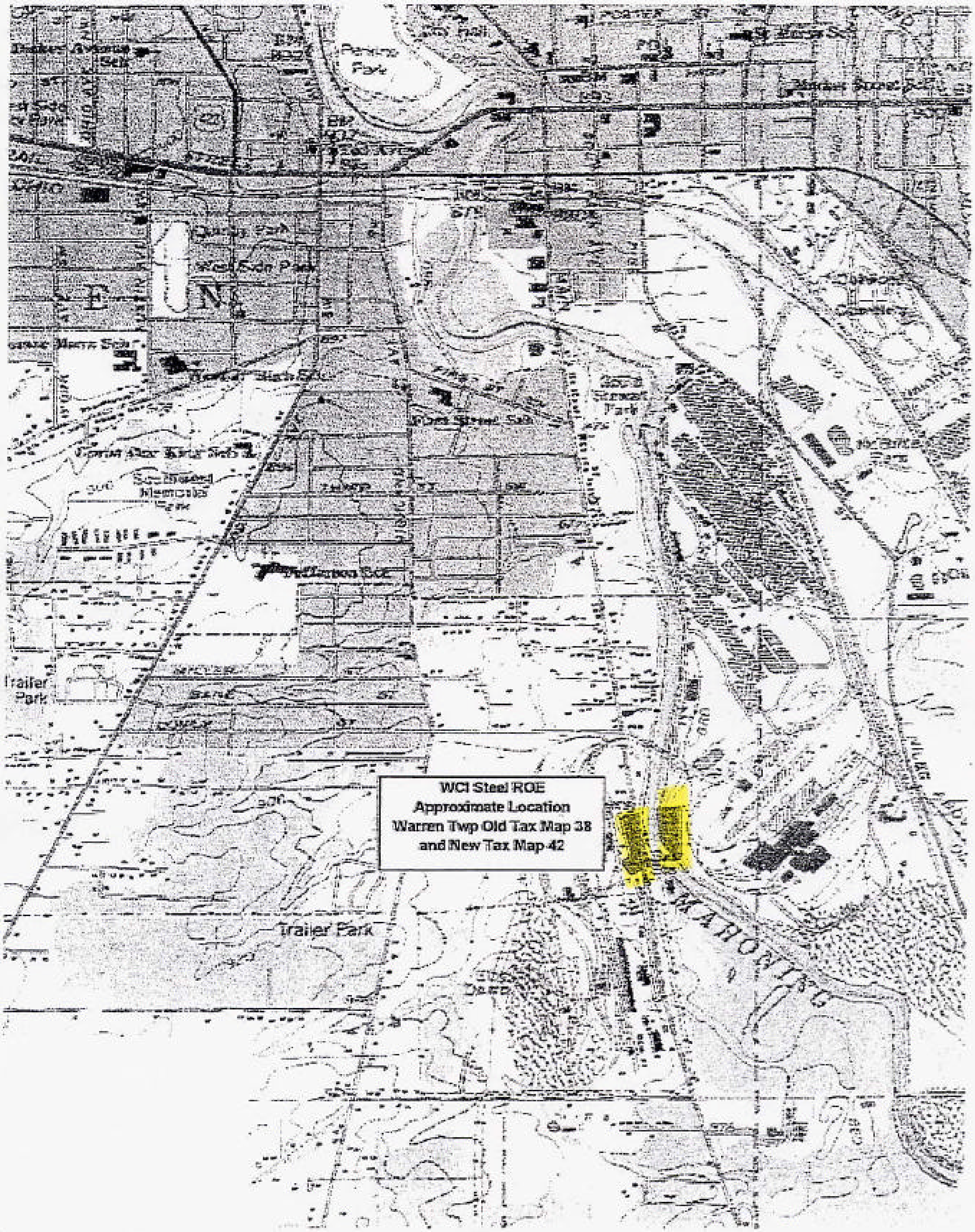
ON 1956 EXHIBIT A

Herbert Thomas Roe

Sections 2/3 near Warren - North River Rd
Dam

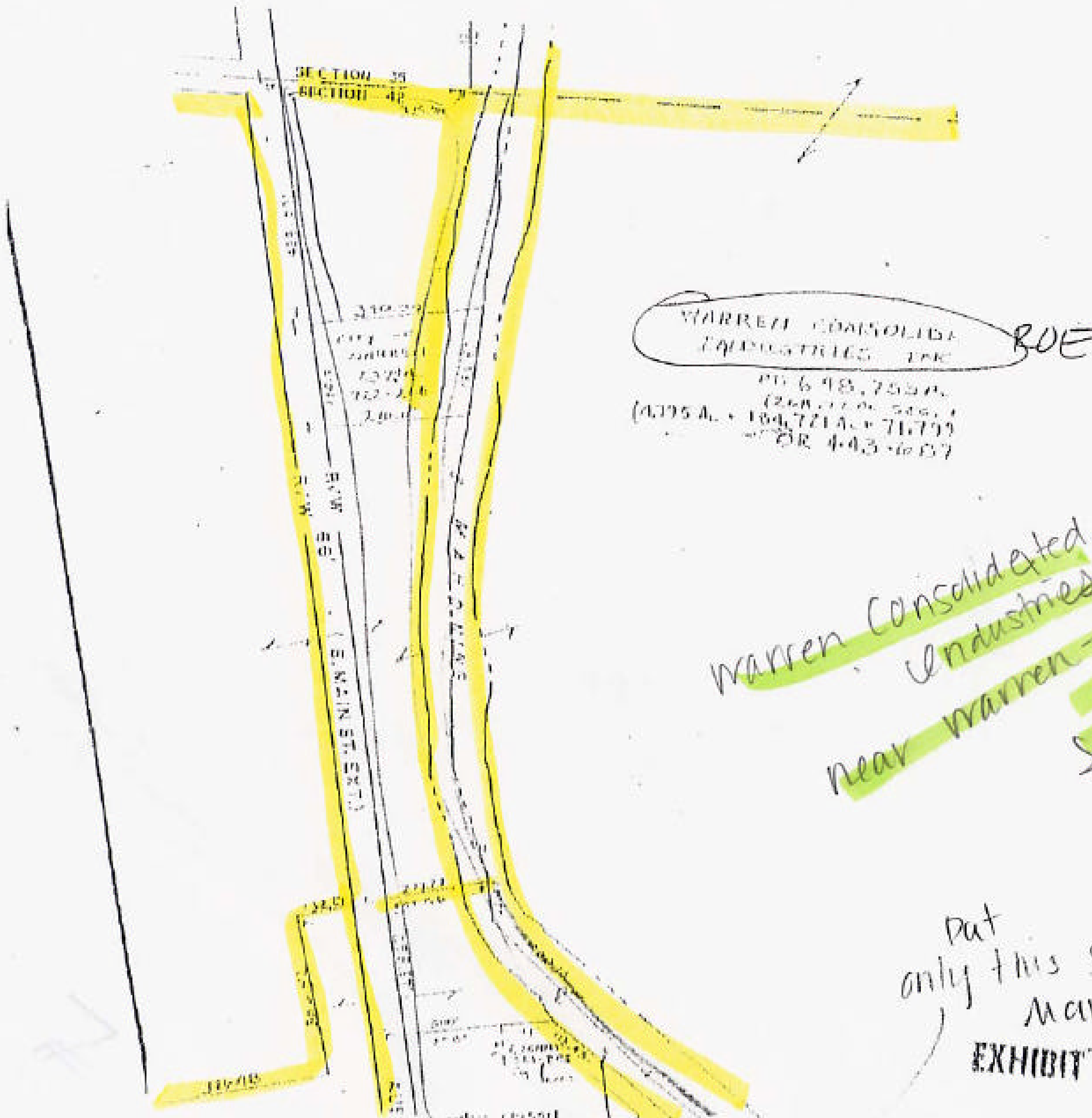


Sections Ohio Edison R/OE
(3/4) near Warren Summit St. Dam



Section 4.5

Near Warren-Main St. Substation Dam



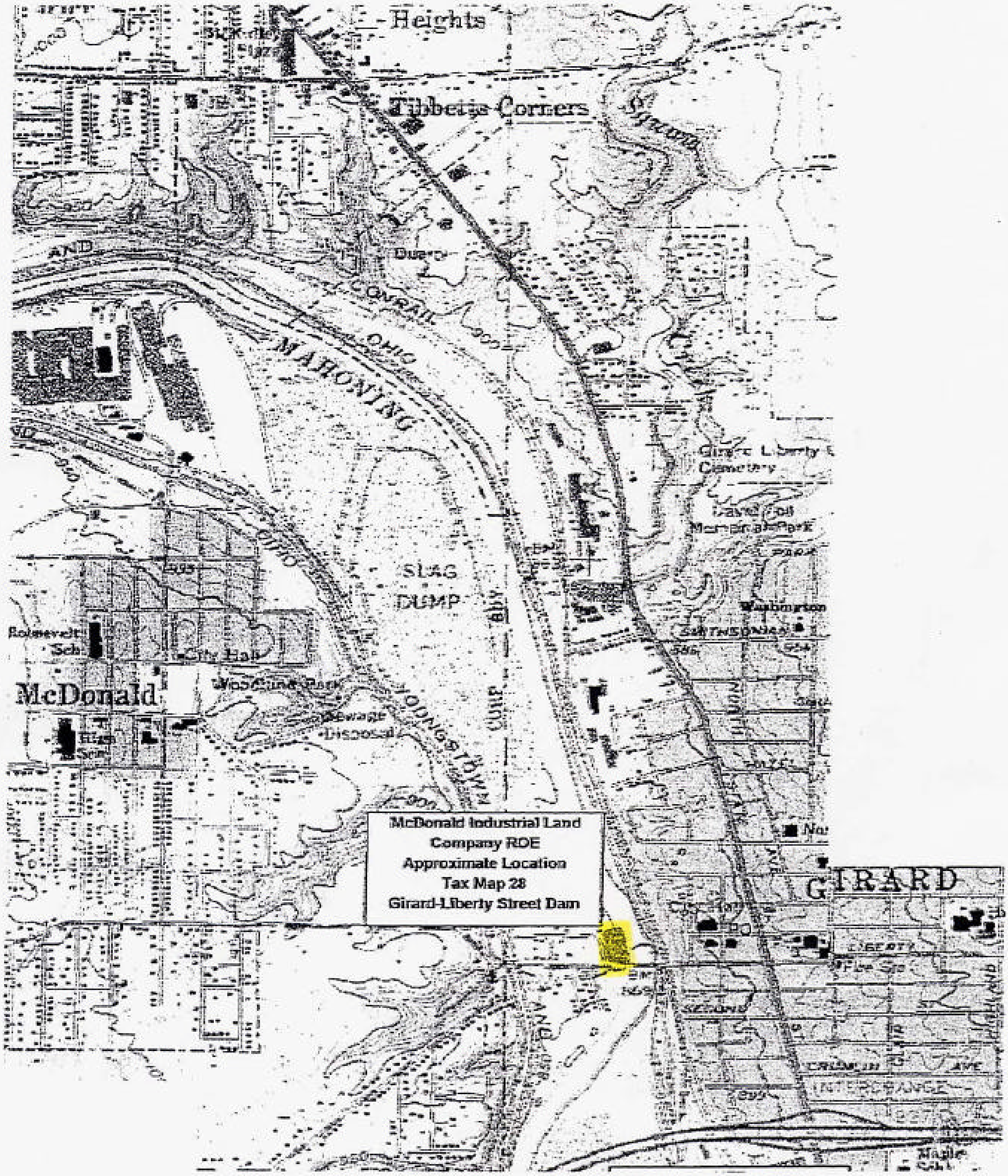
ROE

Warren Consolidated Industries
near Warren - Main st. Dam substation
Sections 4/5

Put only this Section on Map per asking Mike

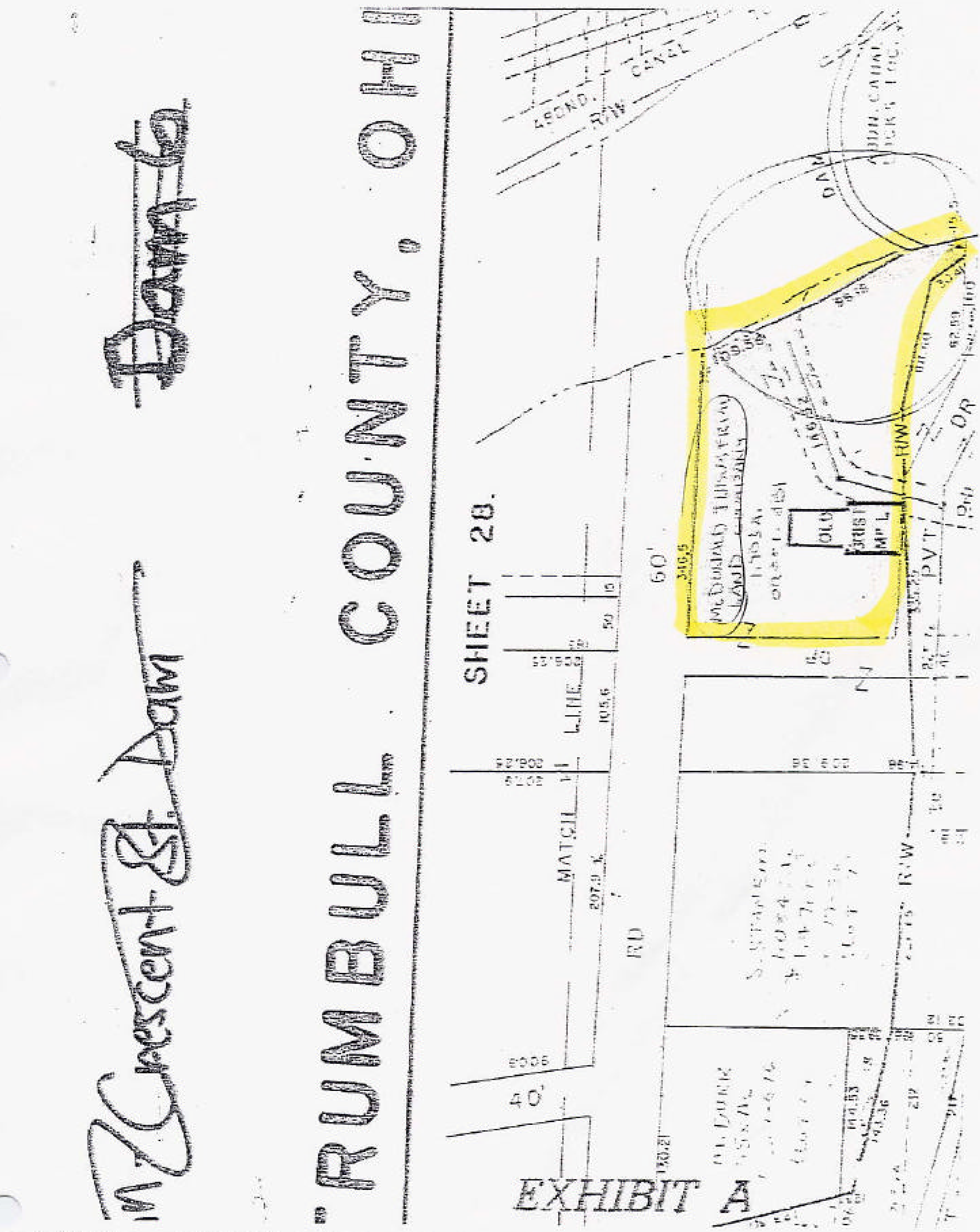
EXHIBIT "A"

Not sure what other lines meant.



sections
5/6

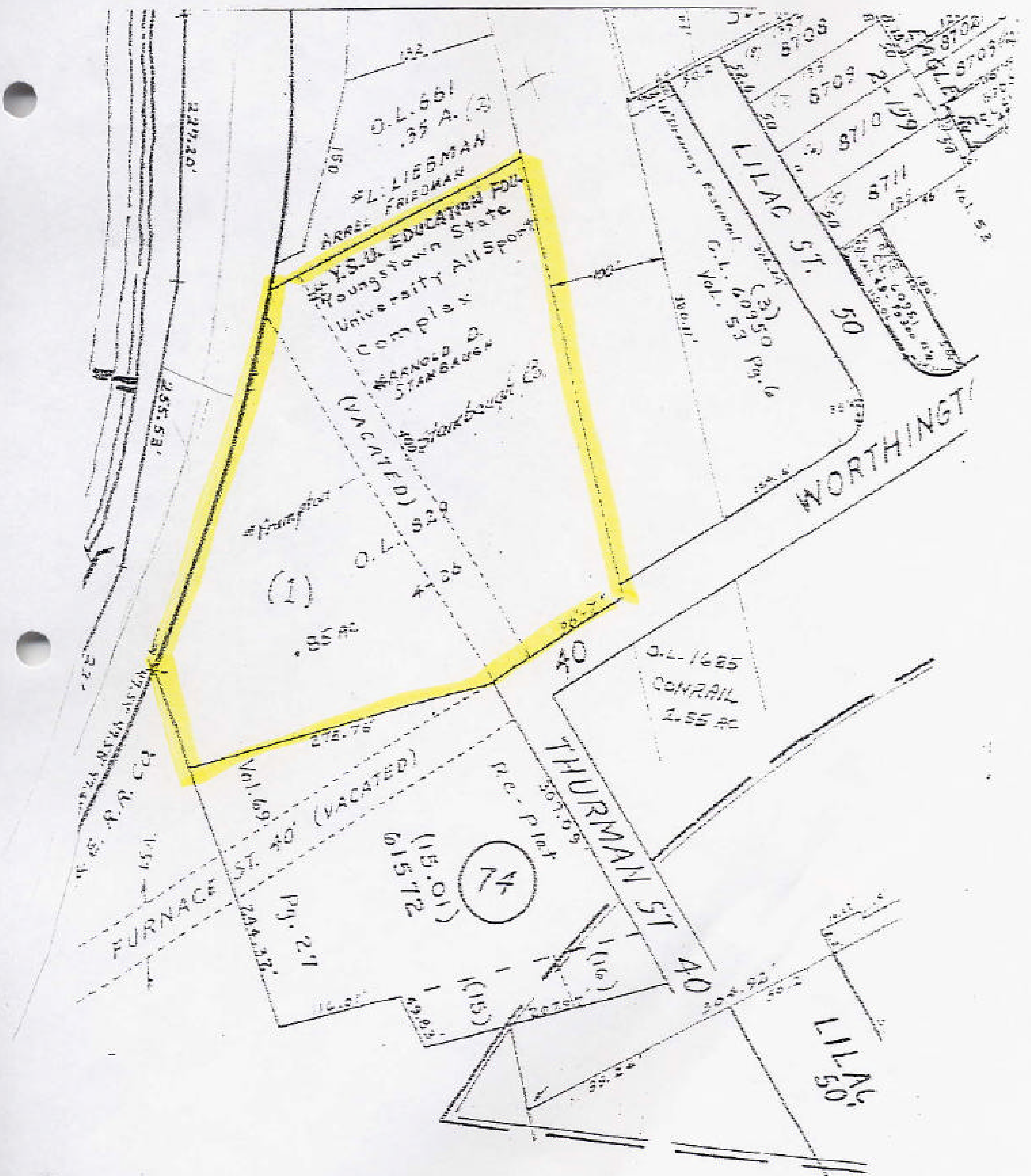
near Girard - Liberty St. Dam



McDonald Industries Plat
near Girard - Liberty St. dam Sections 5 & 6

City of Youngstown ROE
Approximate Location
53-086-0-001.01
Senative Industries ROE
Approximate Location
Brier Hill
West Side
Ted Homestead Cemetery
Drive-in Theater
Slag Dump
Playground
CONRAIL
St. Elizabeths Hospital
Jefferson Sch
OHIO

Sections 6/7



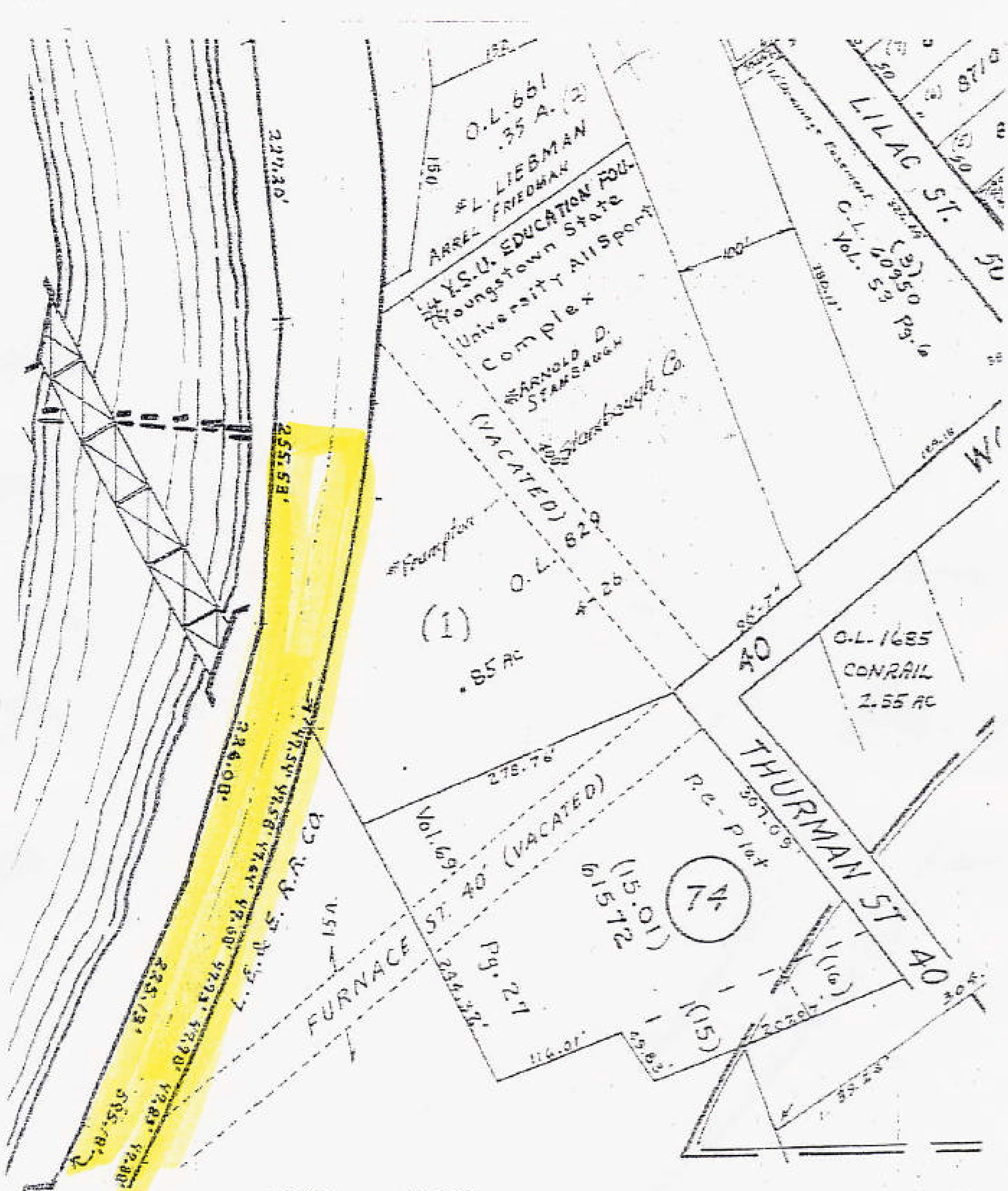
Senative Industries ROE

~~&~~

~~City of Youngstown ROE~~

EXHIBIT A

Sections 6/7
Near Youngstown -
Cresecent
Street Dam



53-086-0-001.01

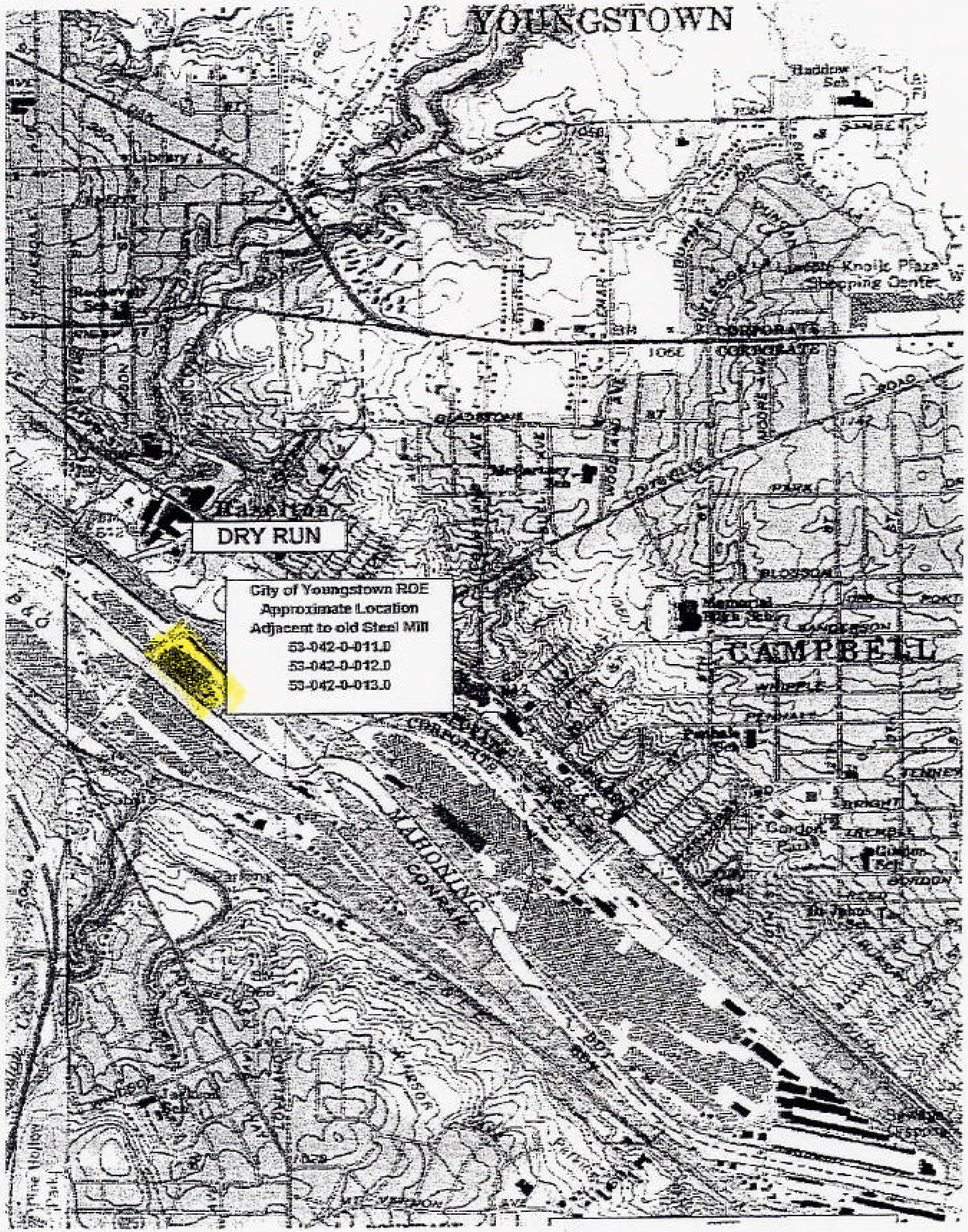
near youngstown cresent st dam

Sections 6/7

~~Senative Conductres ROE~~

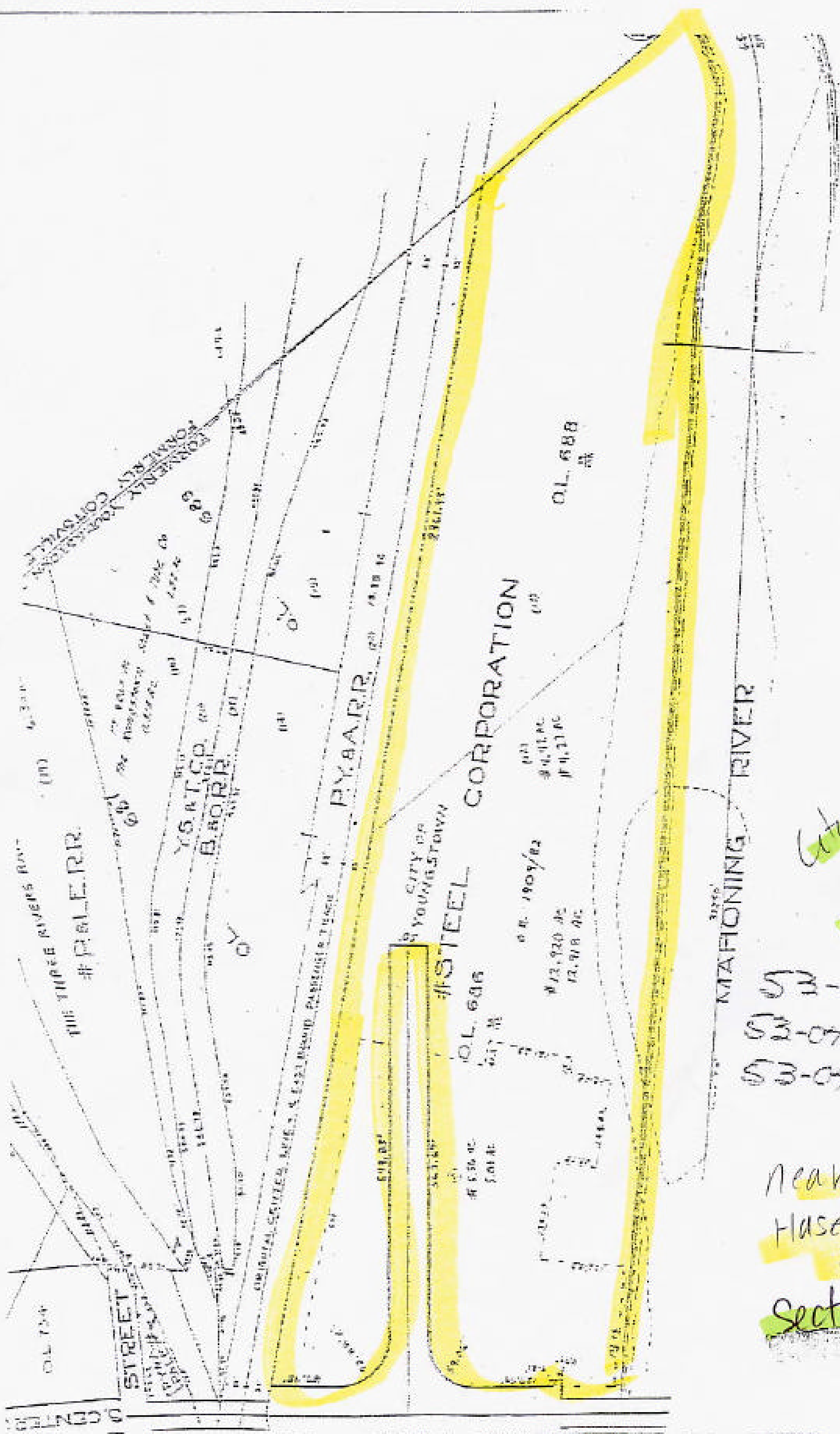
OR

City of Youngstown ROE



City of Youngstown ROE
Adjacent to Old Steel Mill

Sections
8/9

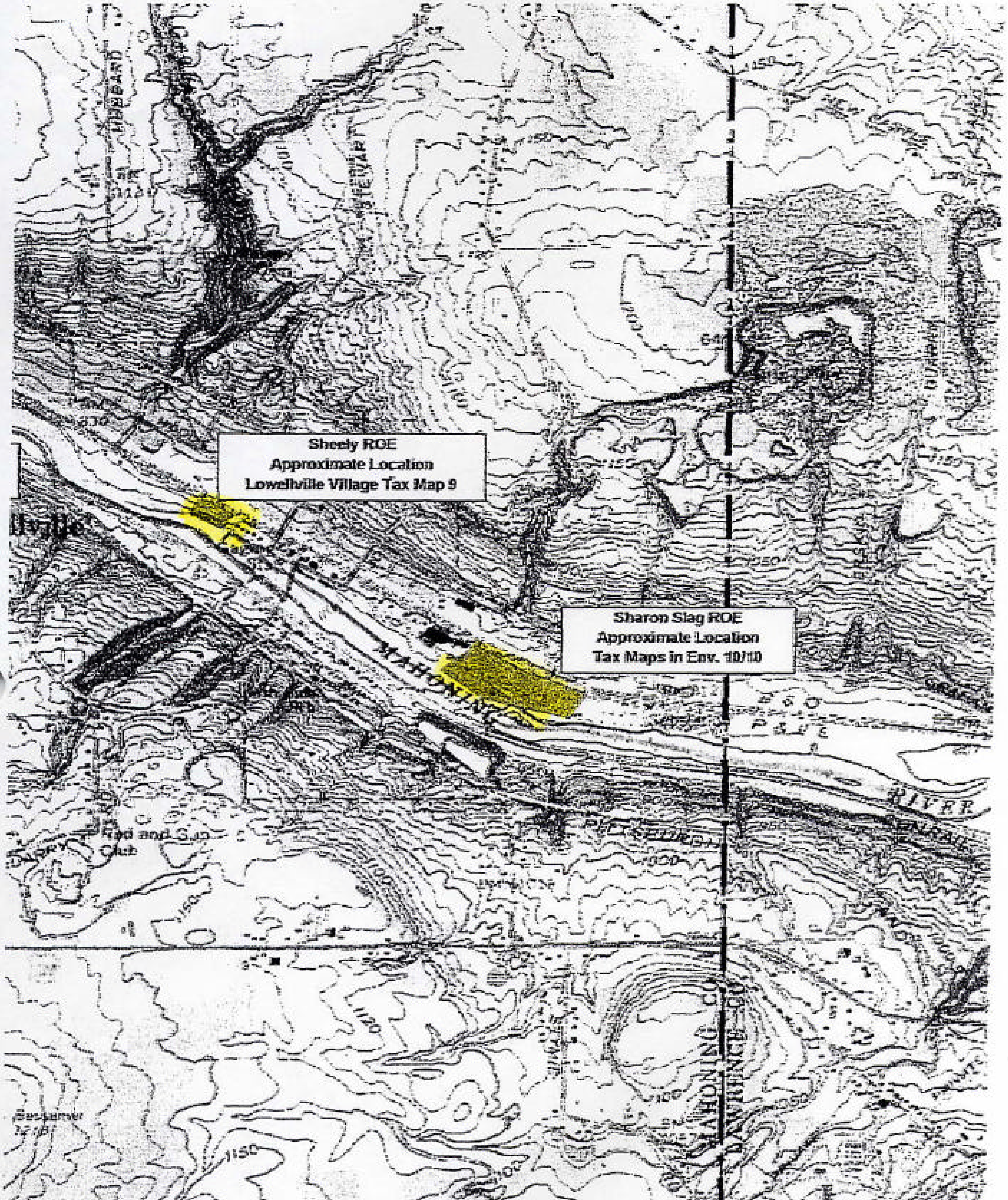


City of Youngstown
ROE
adjacent to old
steel mil

53-042-0-011.0
53-042-0-012.0
53-042-0-013.0

near
Haselton - Center
Street Dam

Sections 8/9



Section 11

Near State Line

Near Lowellville - 1st Street Dam

Sheely ROE

Section 11

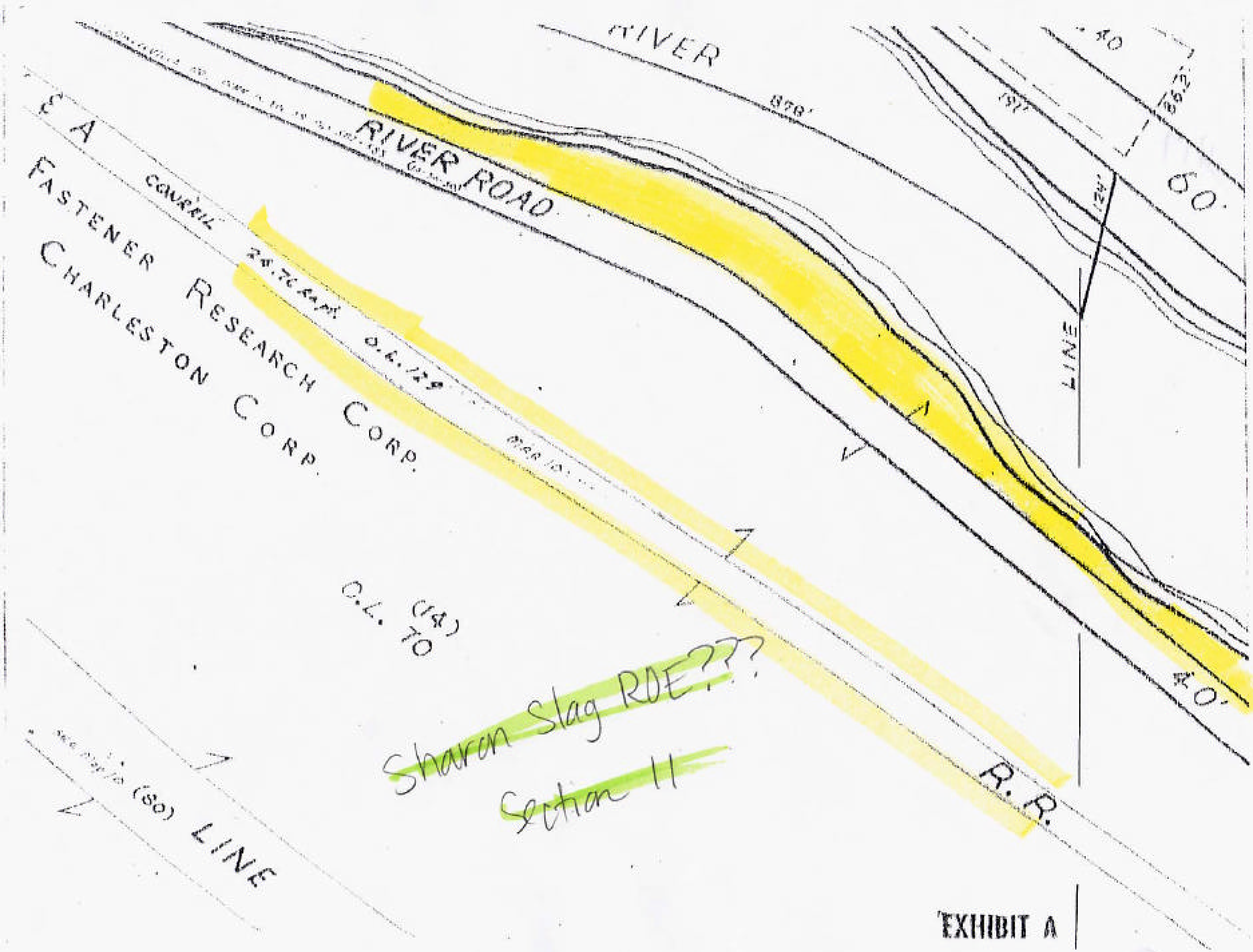

RIVER
878'
RIVER ROAD
60'
40'
LINE
12'
86.3'
40
197
C A
FASTENER RESEARCH CORP.
CHARLESTON CORP.
O.L. 129
O.L. (14) 70
R.R.
(80) LINE
Sharon Slag ROE???
Section 11

EXHIBIT A